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INL Lithologic Core Storage Library

Idaho National Laboratory
Building CFA-663

Operated by the U.S. Geological Survey for the U.S. Department of Energy

Contact:
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USGS INL Project Office
Willow Creek Building
MS 1160
Idaho Falls, ID 83415

Official Name: USGS 148

Logged By: B. Packer

Selected Aliases: None

USGS Site ID: 433535112390801
Contractor Well ID: Not applicable

Drilling Agency: USGS
Year Drilled: 2019
Names of Drillers: M. Gilbert, J. W. Geeting, and S. L. Helmuth
Well Status: Incomplete (redrilled)
Total Depth of Hole (ft): 264.1

Total Core Recovered (ft): 243.5
Beginning Depth (ft): 3.6
Ending Depth (ft): 264.1
[X] Continuous Recovery
[ ] Selected Intervals Recovered
Total # of Core Boxes: 50

County & State: Bingham County, Idaho
Quadrangle Name: Little Butte SW
Lat / Lng: N 43° 35' 35.42" W 112° 39' 07.52" NAD83
Tns / Rng / Sec: T3 North R32 East S13 BDB1
UTM Coordinates: 12N E366642.604 N4828014.904
Surface Elevation (ft): 5140.55 NAVD88

Notes: Deviated hole created during grouting of USGS 148. Deviated hole is USGS 148A and has a separate log. Values in parentheses are in units of feet.

Core Geological Profile

Lithologic and Soil Patterns

Basalt
Fine Sandstone
Silts and Clays

Intervals in Absentia

Surficial Material
Missing Section

Basalt Symbols

Vesicle Zone
Megavesicle
Vesicle Plane
Pipe Vesicle
Vesicle Sheet
Vesicle Cylinder
Spatter Feature
Flow/Mold
Large Vesicles

Sedimentary Rock Symbols

Mudstone with Sandy Interbeds
Massive Lithified Sediment
Loose Sediment

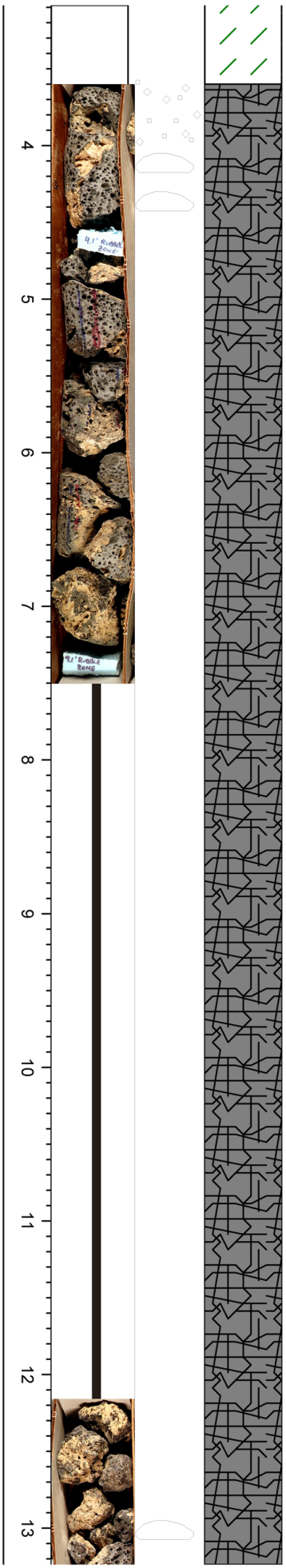
Ped Textures

Platy Peds
Blocky Peds
Granular Peds

Depth (feet & tenths)	Core Photo	Igneous, Soil and Sed Structures	Lithology	Description: Miscellaneous Text	Description: Lithologic Description	Fracture Frequency (See fracture classification on website.)	Vesicle Characteristics
0					Surficial Sediment: (0.0-3.6) Unrecovered		
1							
2							
3							

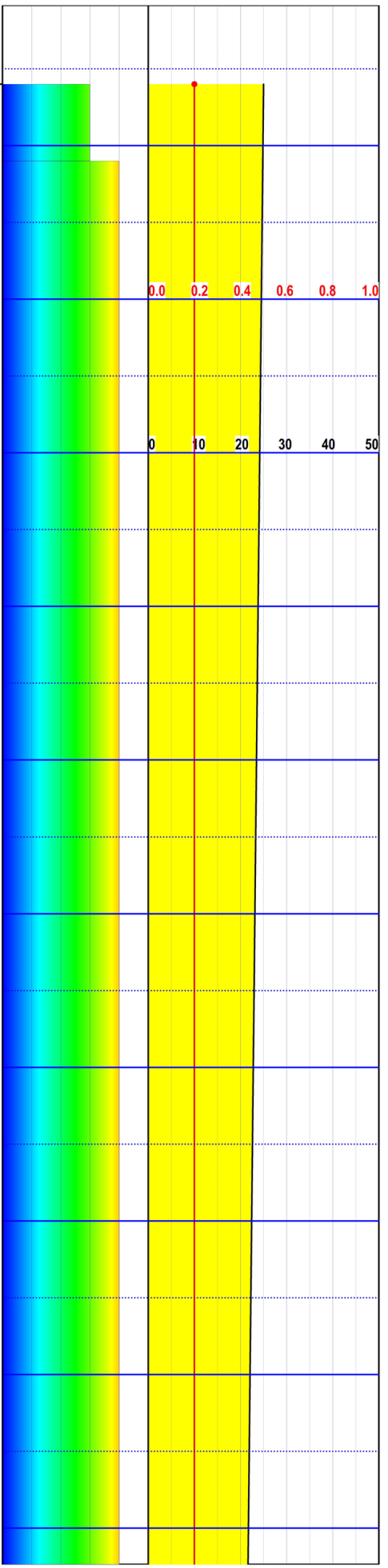
Fracture Frequency: 0 1 2 3 4 5

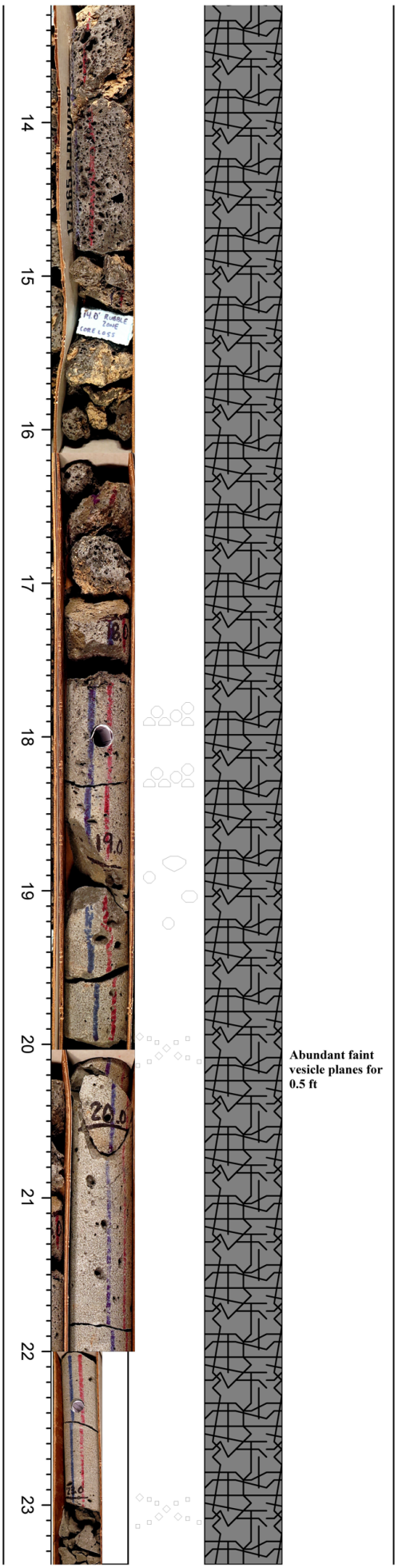
Vesicle Characteristics
Mean Size (in): 0 0.2 0.4 0.6 0.8 1.0
Volume Percentage: 0 10 20 30 40 50



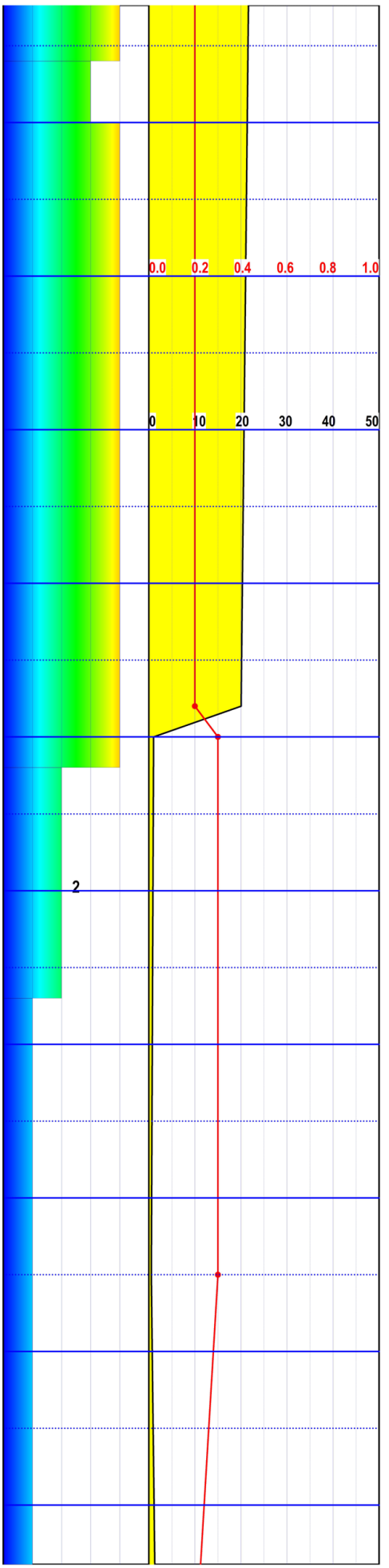
Vesicle zone continues to 18.0 ft
Additional 2 megavesicles in 0.4 ft interval

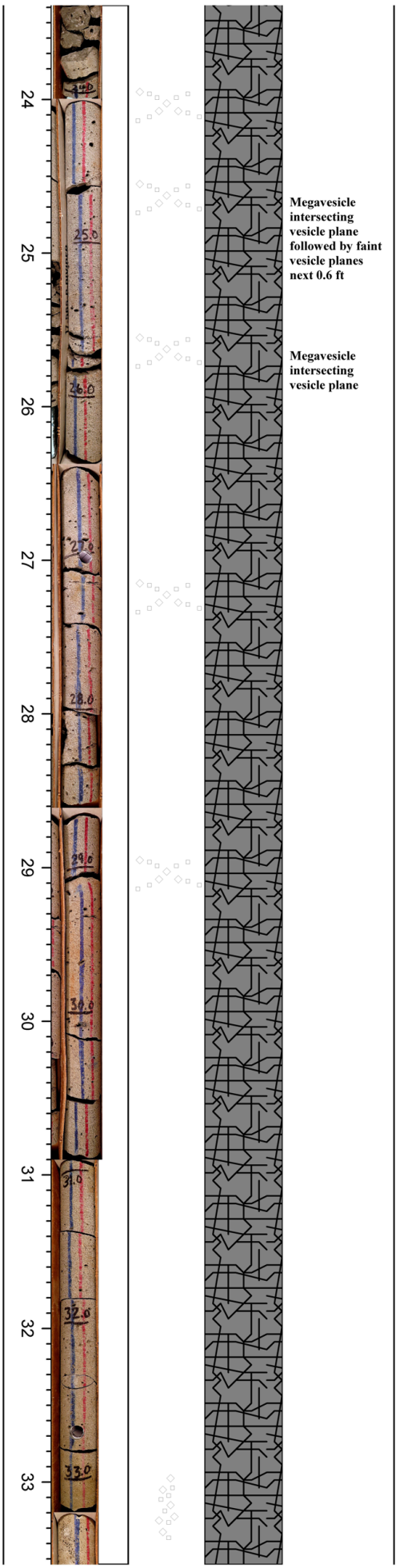
Basalt: (3.6-49.1)
COLOR: N3 dark gray (3.6-18.9); grading to N4 medium dark gray (18.9-23.0); grading to N5 medium gray (23.0-46.5); grading to N3 dark gray (46.5-49.1).
TEXTURE: Vesicular, weakly diktytaxitic, massive, and aphanitic basalt. Aphanitic throughout; vesicular containing infrequent 0.3-0.6 in oblate large vesicles (3.6-17.8); weakly diktytaxitic (17.8-46.0); vesicular (46.0-47.0); massive with vertical natural fractures (47.0-48.9); and weakly vesicular (48.9-49.1).
COMPOSITION: 5% euhedral to subhedral microcrystalline equant phenocrystic plagioclase. <1-3% euhedral to subhedral microcrystalline olivine occurring in glomerocrysts and as phenocrysts; abundance increases in massive section nearing bottom of hole. Rest cryptocrystalline matrix.
XENOLITHS: None noted.
ALTERATION: 5RP 4/2 grayish red purple oxidization on natural fracture surfaces throughout interval. 10YR 8/2 very pale orange very fine sediment coating with fine to medium basalt sand coating rubble zone and finely coating on natural fracture surfaces.
NOTES: Rubble zones from 9.1-12.7 ft, 14.0-17.8 ft, and 46.4-47.0 ft. Partial core loss in 14.0-17.8 ft rubble zone.





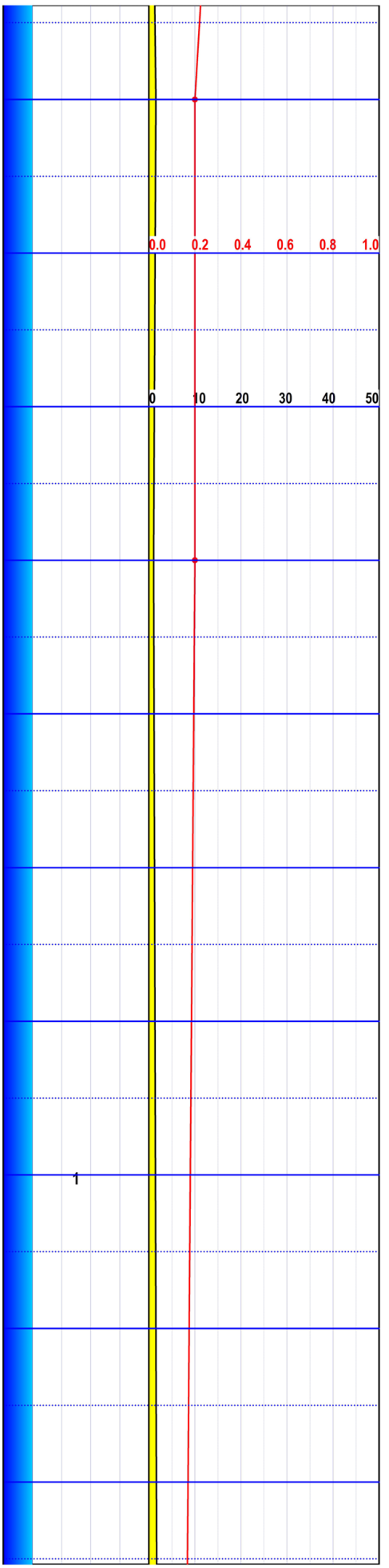
Abundant faint vesicle planes for 0.5 ft

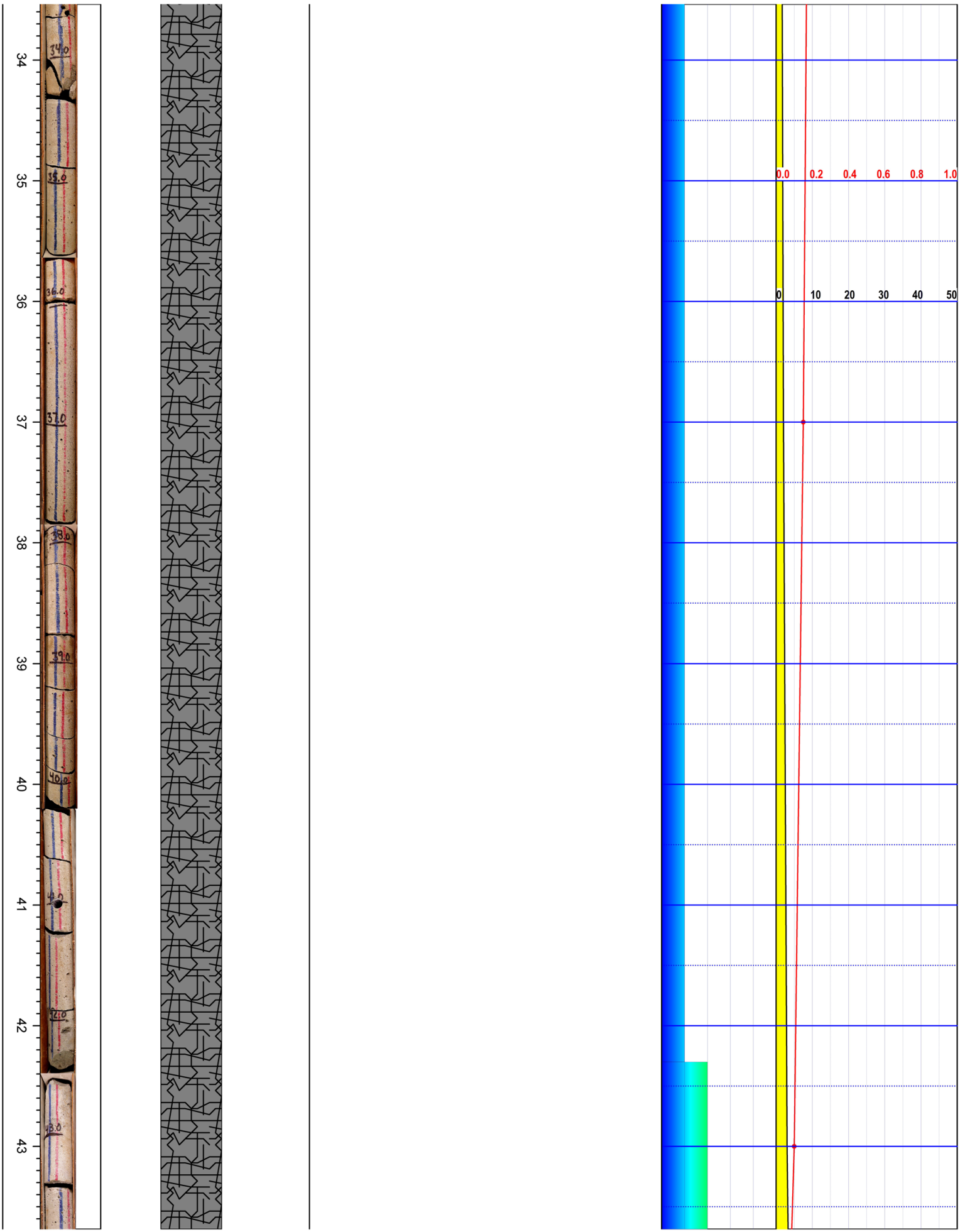




Megavesicle intersecting vesicle plane followed by faint vesicle planes next 0.6 ft

Megavesicle intersecting vesicle plane

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37.0
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40.0
41.0
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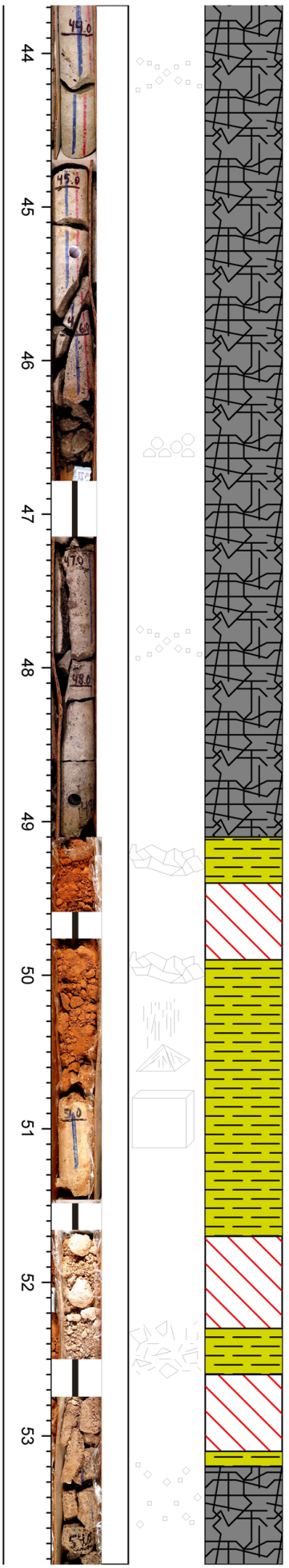
50



Vesicle zone continues to 70.5 ft

Silts and Clays: (49.1-49.4)
USCS ML - Inorganic silt
TEXTURE: Silts and clays
COLOR: 10R 4/6 moderate reddish brown oxidized/baked top (<0.1) transitioning sharply to 5YR 5/6 light brown.
CONSISTENCE: Friable.
STRUCTURE: Blocky to granular.
FREE CARBONATE: None.
ROCK: Few super fine lithic sand.
ROOTS/FOSSILS: None noted.

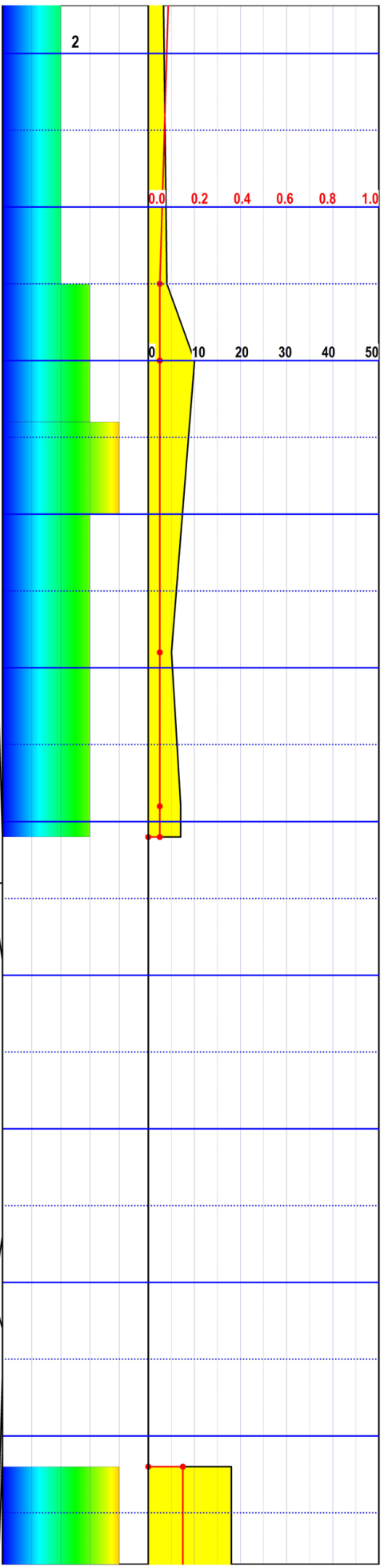
Missing Section: (49.4-49.9)
Removed for testing

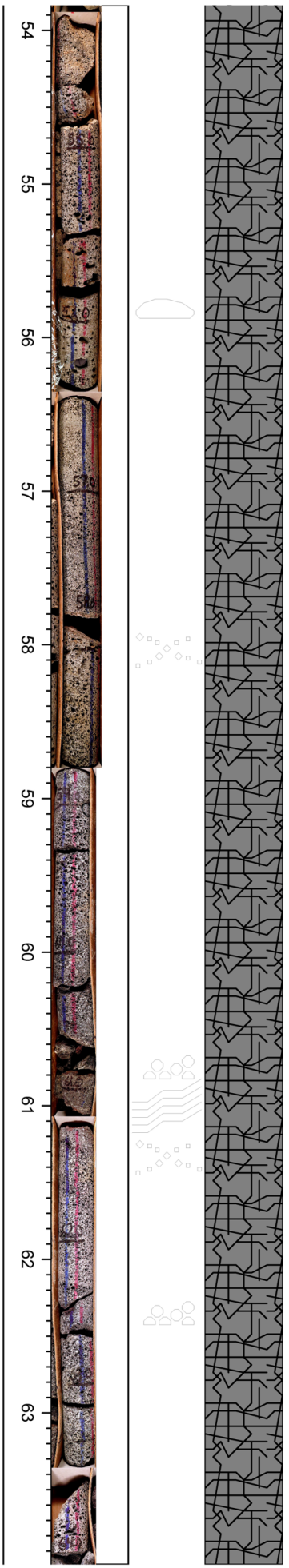
Silts and Clays: (49.9-51.7)
USCS ML - Inorganic silt
TEXTURE: Silts and clays
COLOR: 5YR 5/6 light brown (49.9-50.9) transitioning sharply to 10YR 8/2 very pale orange with paleosol grading to N9 white last 0.3 ft (50.9-51.7).
CONSISTENCE: Friable from brown (49.9-50.9) to extremely firm (50.9-51.7).
STRUCTURE: Blocky, granular, and weakly structureless-single grained from 49.9-50.9 ft and structureless-massive from 50.9-51.7 ft.
FREE CARBONATE: None from 49.9-50.9 ft with small grading to strong from 50.9-51.7 ft.
ROCK: Few super fine lithic sand.
ROOTS/FOSSILS: None noted.
NOTES: 50.9 well cemented with carbonate, possible hardpan.

Missing Section: (51.7-52.3)
Removed for testing

Silts and Clays: (52.3-52.6)
USCS ML - Inorganic silt
TEXTURE: Silts and clays
COLOR: N9 white with ~30% 5YR 7/2 grayish orange pink peds; 5YR 7/2 grades to over 70% of peds at bottom of segment.
CONSISTENCE: Mostly friable, weakly loose.
STRUCTURE: Granular with some blocky.
FREE CARBONATE: Strong.
ROCK: Few super fine lithic sand.
ROOTS/FOSSILS: None noted.

Missing Section: (52.6-53.1)



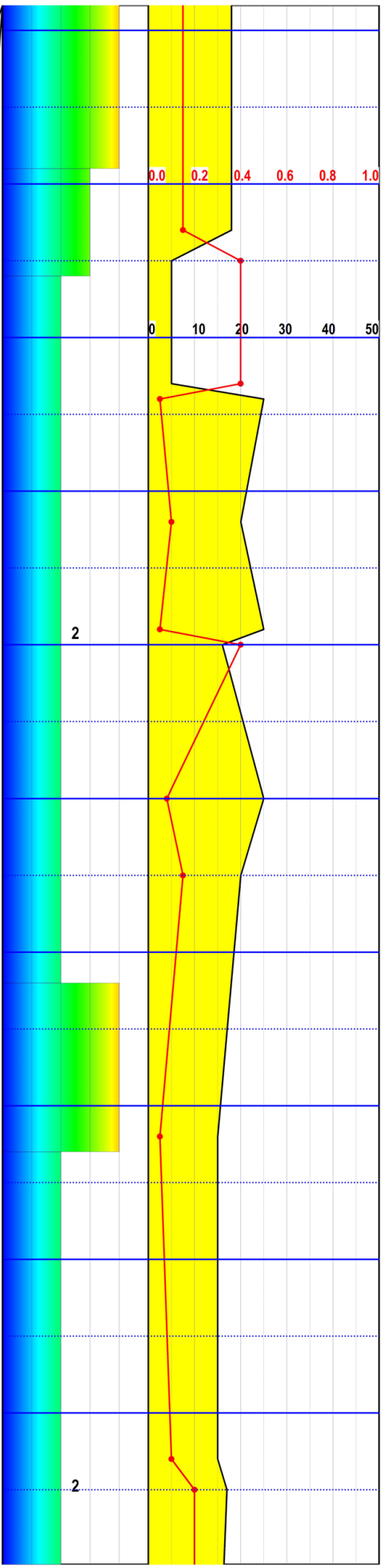


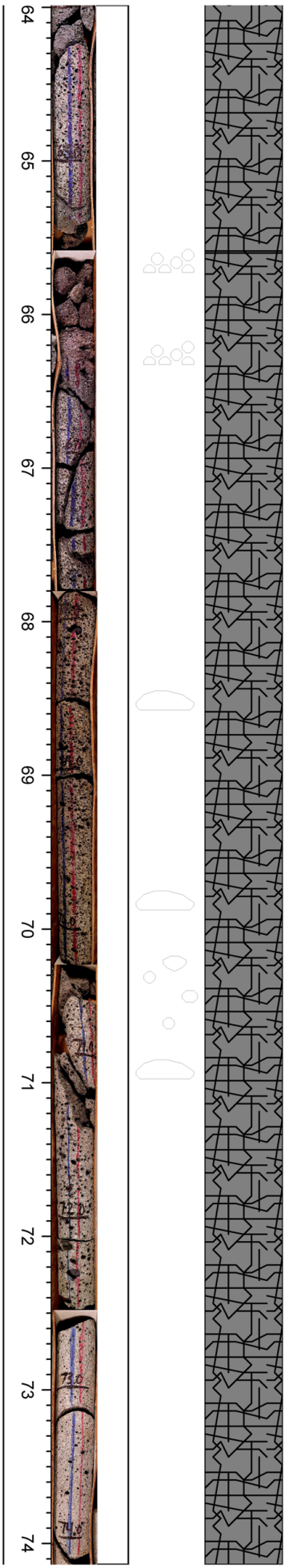
Glassy matrix

Removed for testing

Silts and Clays: (53.1-53.2)
Continuation of 52.3-52.6 ft paleosol interval.

Basalt: (53.2-65.6)
COLOR: N2 grayish black (53.2-58.0); grading to N5 medium gray (59.0-60.0); grading to N2 grayish black (60.0-60.9); grading to N4 medium dark gray (60.9-65.3); grading to N2 grayish black (65.3-65.6).
TEXTURE: Vesicular and aphanitic basalt; horizontal natural fractures top 1 ft of segment; N8 very light gray vesicular coating (64.0).
COMPOSITION: 15% euhedral to subhedral <0.1 to rare 3 mm phenocrystic plagioclase occurring as glomerocrysts; 1.2 cm glomerocryst (60.2). Rest cryptocrystalline matrix.
XENOLITHS: None noted.
ALTERATION: 5YR 7/2 grayish orange pink reactive sediment coating on all surfaces from 53.2 to 54.9 ft and on a natural fractures surface at 58 ft. 5RP 4/2 grayish red purple oxidization on natural fracture surfaces.
NOTES: Description of top 1 ft of flow obstructed from abundant sediment coating.

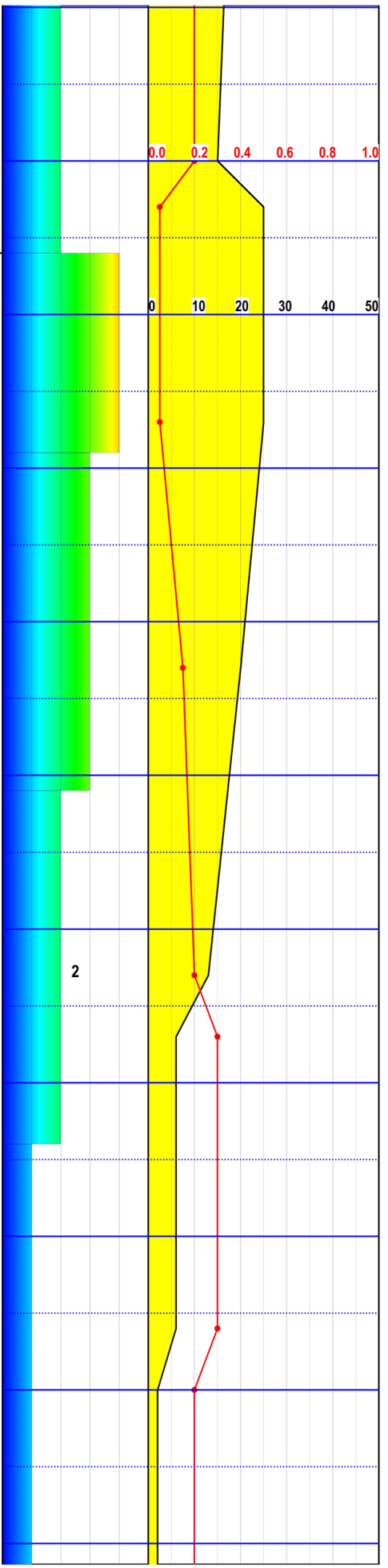


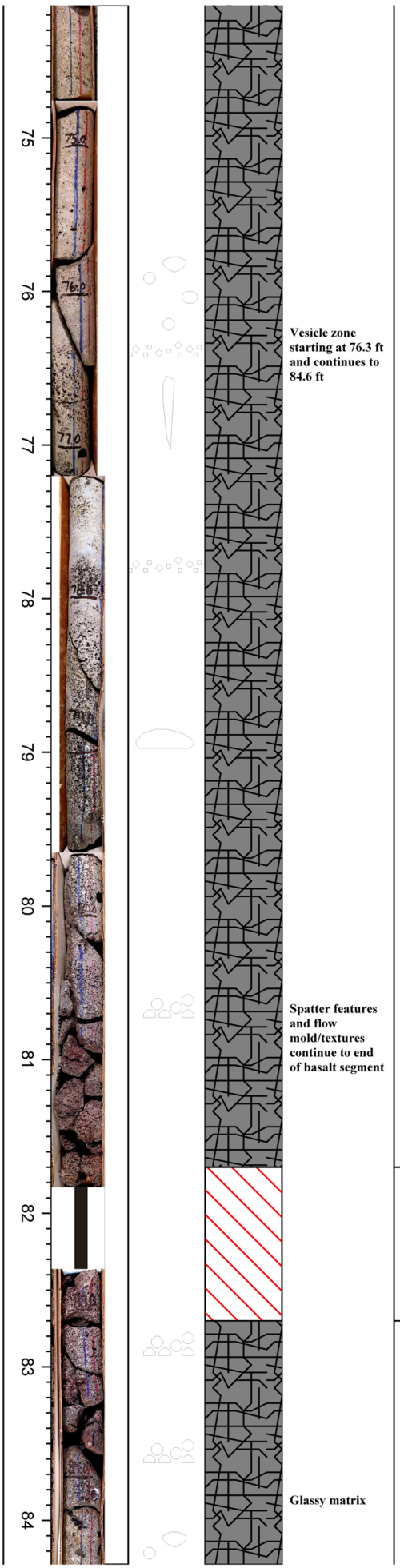


Large vesicles continuing to 73 ft

Additional 4 megavesicles in 1.5 ft interval

Basalt: (65.6-81.7)
COLOR: N2 grayish black with 5RP 4/2 grayish red purple cast on natural fracture surfaces top 2.1 ft (65.6-70.3); grading to N4 medium dark gray (70.3-79.0); grading to N3 dark gray with 10R 3/4 dark reddish brown surface oxidization bottom 1.2 ft (79.0-81.7).
TEXTURE: Vesicular, porphyritic, and massive basalt. Porphyritic throughout; vesicular (65.6-70.3); weakly vesicular with large vesicles (70.3-72.6); massive with sparse vesicle sheets (72.6-77.8); vesicular (77.8-81.7); cinder/scoriaceous rubble top 0.7 ft of segment.
COMPOSITION: 5-20% euhedral <0.1-2 mm tabular and rare equant phenocrystic plagioclase; rare phenocrysts; abundance increasing into massive section. <1% euhedral microcrystalline olivine in massive interval. <1% euhedral ~0.5 mm pyroxene in massive interval. Rest cryptocrystalline matrix.
XENOLITHS: White granular glassy mineral agglomeration (60.2).
ALTERATION: 5RP 4/2 grayish red purple oxidization top 2.1 ft. 10R ¾ dark reddish brown oxidization of flow features bottom 1.2 ft of segment.
NOTES: Rubble zone from 80.7 ft to 81.7 ft.

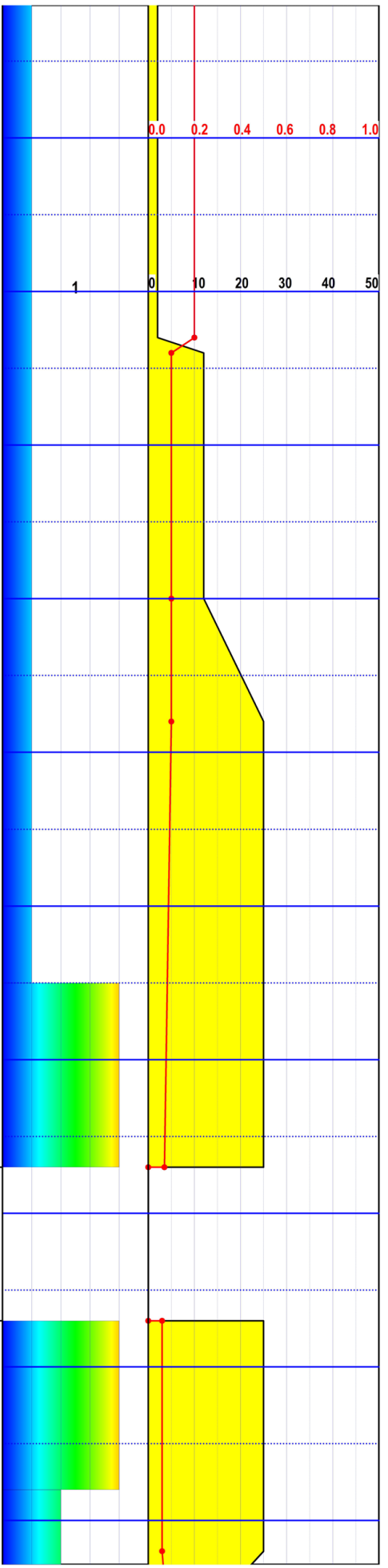




Vesicle zone starting at 76.3 ft and continues to 84.6 ft

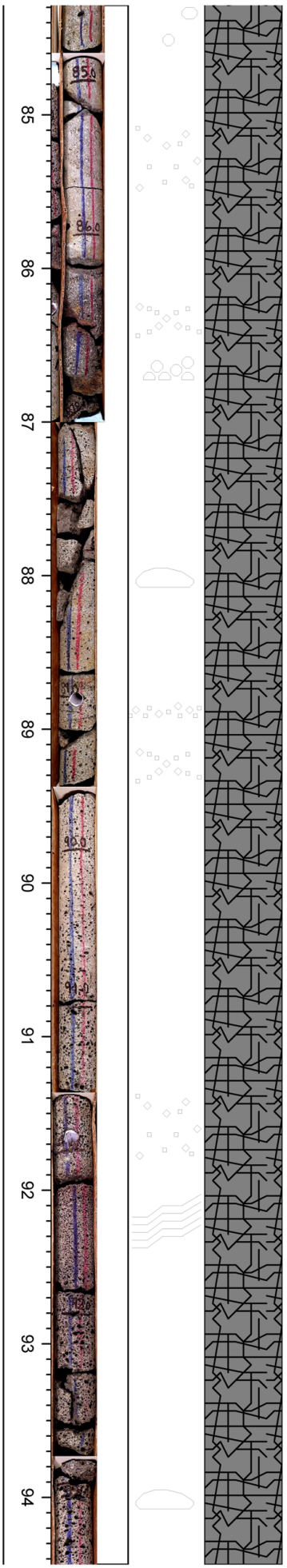
Spatter features and flow mold/textures continue to end of basalt segment

Glassy matrix



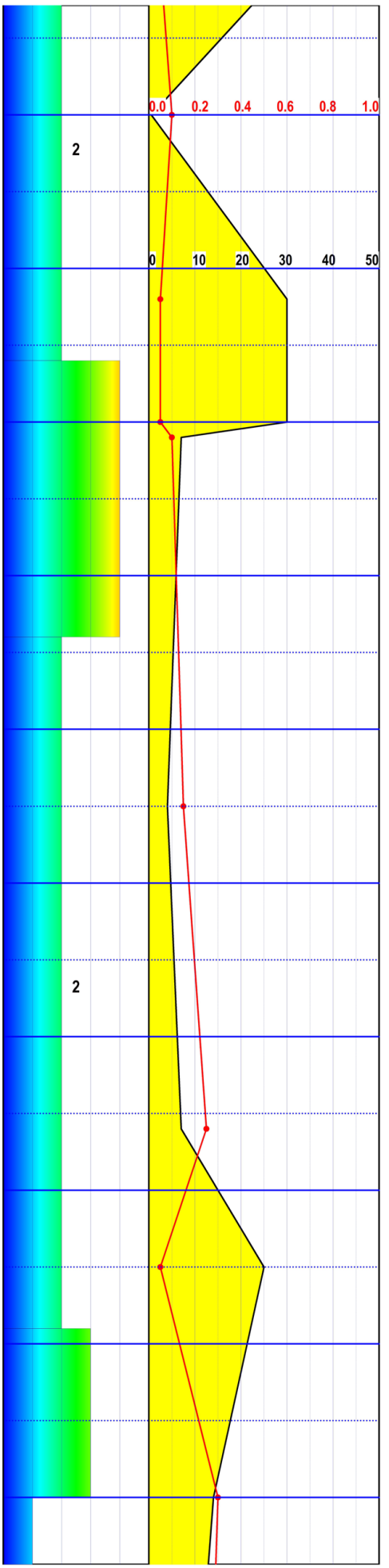
Missing Section: (81.7-82.7)
Rubble zone - loss of core

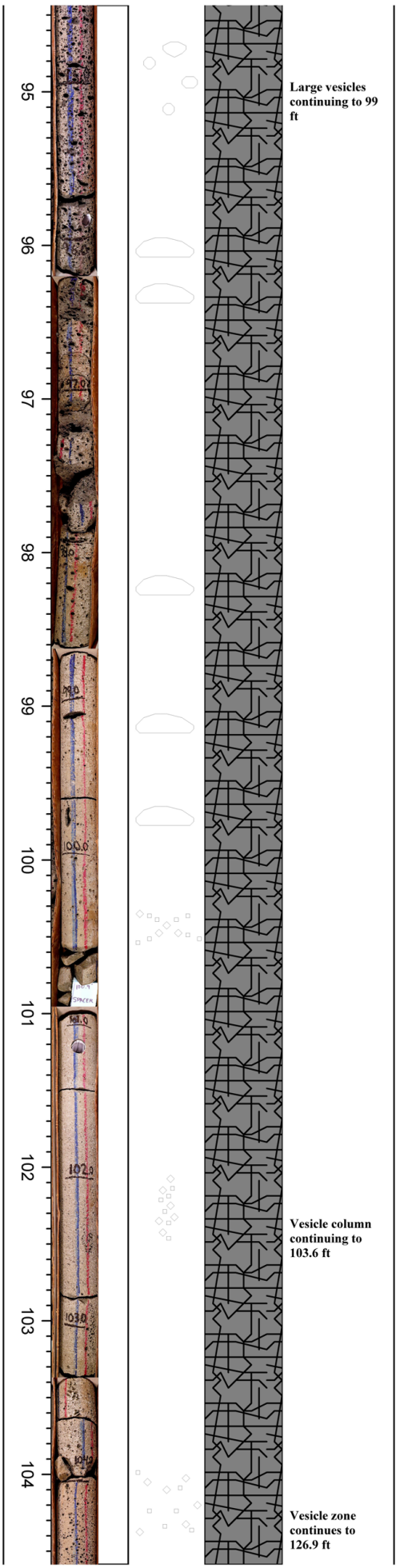
Basalt: (82.7-105.8)
COLOR: N2 grayish black gray with 10R 3/4 dark reddish brown cast (82.7-83.6); grading to N3 dark gray (83.6-89.0); grading to N5 medium gray (89.0-92.2); sharply transitioning to N2 grayish black (92.2-96.2); grading to N4 medium dark gray (96.2-104.0); grading to N2 grayish black (104.0-105.8).
TEXTURE: Porphyritic, vesicular, massive, and diktytaxitic basalt. Porphyritic throughout; vesicular (82.7-84.9); massive to weakly vesicular (84.9-86.2); vesicular (86.2-87.0); diktytaxitic and weakly vesicular with vertically fractured zone from 86.5 ft to 87.4 ft (87.0-91.0); grading to vesicular with large vesicles from 93 ft to 100 ft (91.0-96.3); grading to



Vesicle zone continues to 95.5 ft

diktytaxitic and weakly vesicular (96.3-98.7); diktytaxitic to massive (98.7-104.8); grading to vesicular (104.8-105.8).
COMPOSITION: 30-45% euhedral to subhedral <1-3 mm tabular phenocrystic plagioclase; half of crystals occur as glomerocrysts; rare equant phenocrysts. 0.5-2% subhedral to anhedral submillimeter phenocrystic olivine occurring in glomerocrysts. <0.5% acicular ilmenite growth in vesicles at 93.8 ft.
XENOLITHS: White to translucent granular glassy mineral agglomeration in black glass (85.0).
ALTERATION: 10R 3/4 dark reddish brown oxidization of spatter features throughout segment. 5RP 6/2 pale red purple oxidization of natural fracture surfaces throughout segment. Olivine altering to iddingsite.

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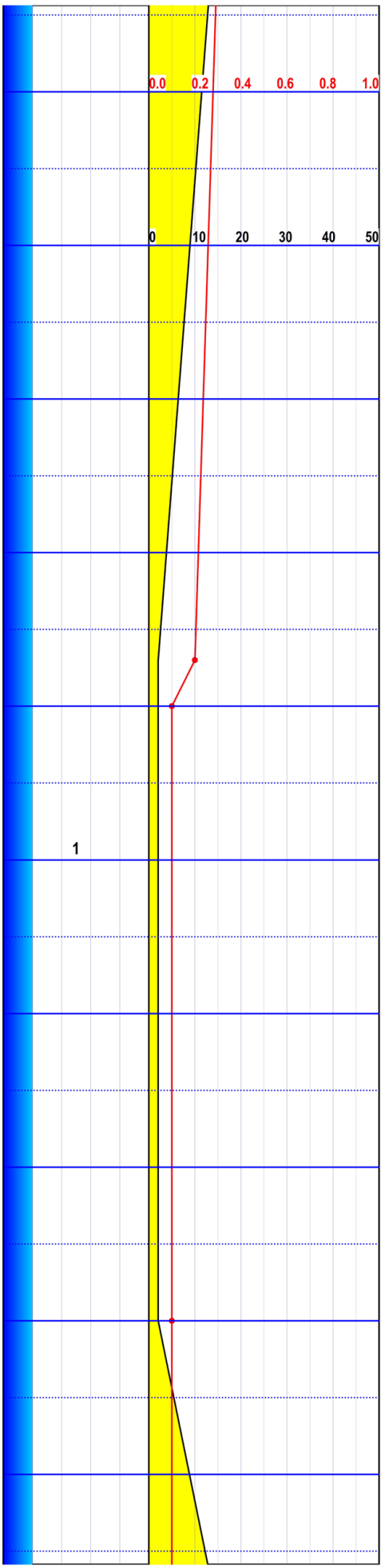
100
101
102
103
104
97.0
98.0
99.0
100.0
101.0
102.0
103.0
104.0
SPACER
Large vesicles continuing to 99 ft
Vesicle column continuing to 103.6 ft
Vesicle zone continues to 126.9 ft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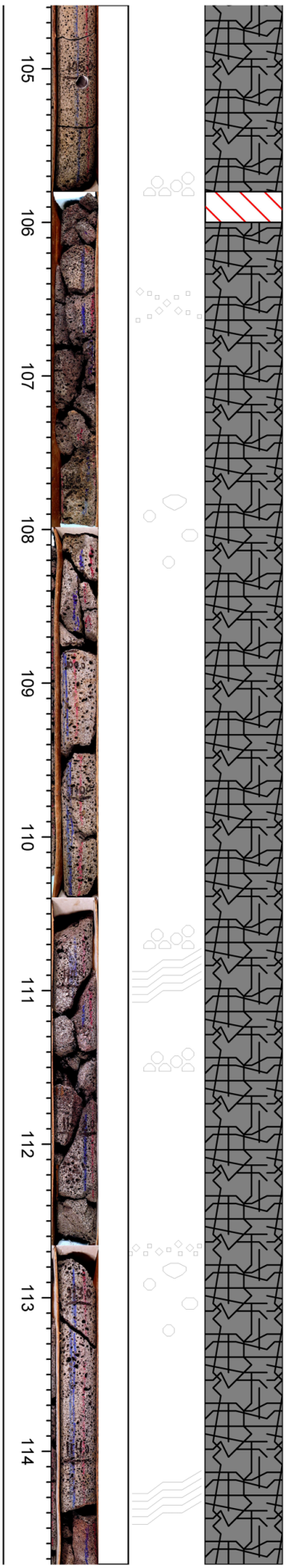
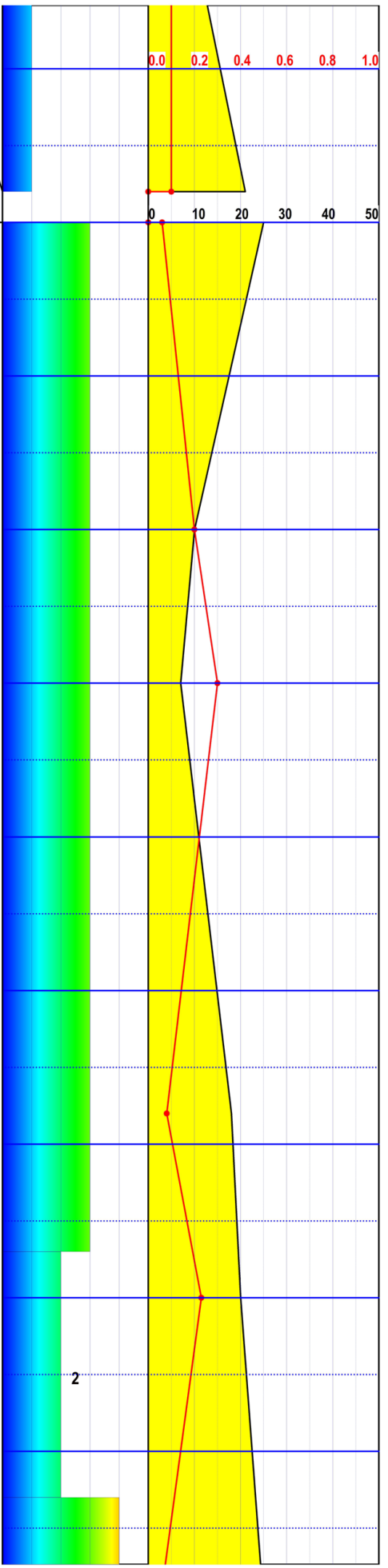
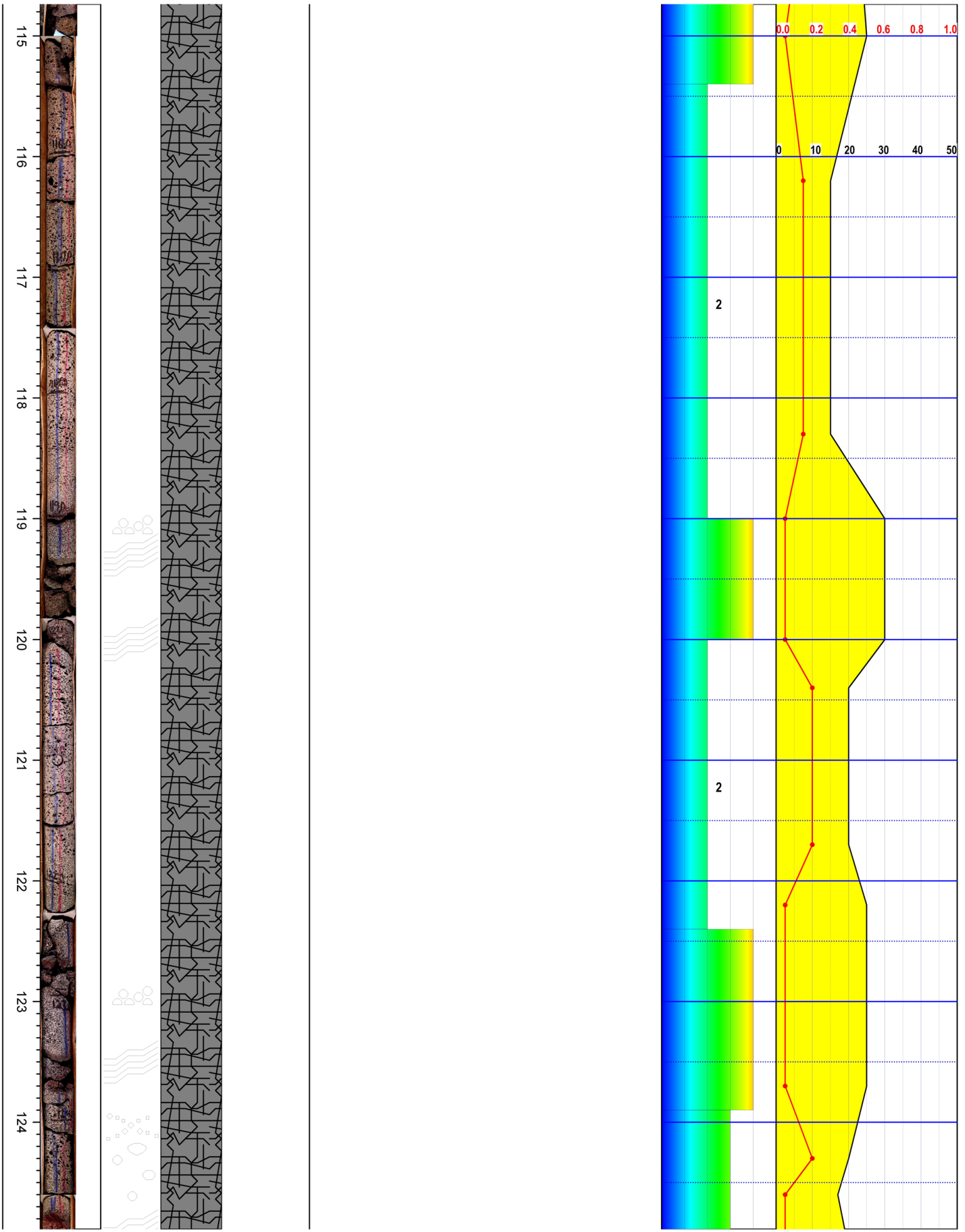


Large vesicles continuing to 109.4 ft

Missing Section: (105.8-106.0)
Rubble zone - loss of core

Basalt: (106.0-143.4)
COLOR: N2 grayish black (106.0-109.0); grading to N4 medium dark gray (109.0-110.7); grading to N2 grayish black (110.7-112.8); grading to N4 medium dark gray (112.8-119.0); grading to N2 grayish black (119.0-128.6); grading to N4 medium dark gray (128.6-141.5); grading to N2 grayish black (141.5-143.6).
TEXTURE: Porphyritic, vesicular, massive, and diktytaxitic basalt. Porphyritic throughout; vesicular with large vesicles from 122 ft to 130.6 ft (106.0-130.6); massive to weakly diktytaxitic and weakly vesicular (130.6-134.0); massive (134.0-136.7); diktytaxitic (136.7-140.4); vesicular (140.4-143.4).
COMPOSITION: 8-30% euhedral to subhedral <1-2 mm phenocrystic plagioclase. <1% submillimeter olivine. Coarse ash included in bottom 1 ft of segment.
XENOLITHS: White to translucent granular glassy mineral agglomeration in black glass (110.3).
ALTERATION: 5RP 4/2 grayish red purple oxidization on natural fracture surfaces throughout segment. 10R 3/4 dark reddish brown and 5R 4/2 grayish red oxidization of flow features, spatter features, and glassy matrix. Olivine to iddingsite.

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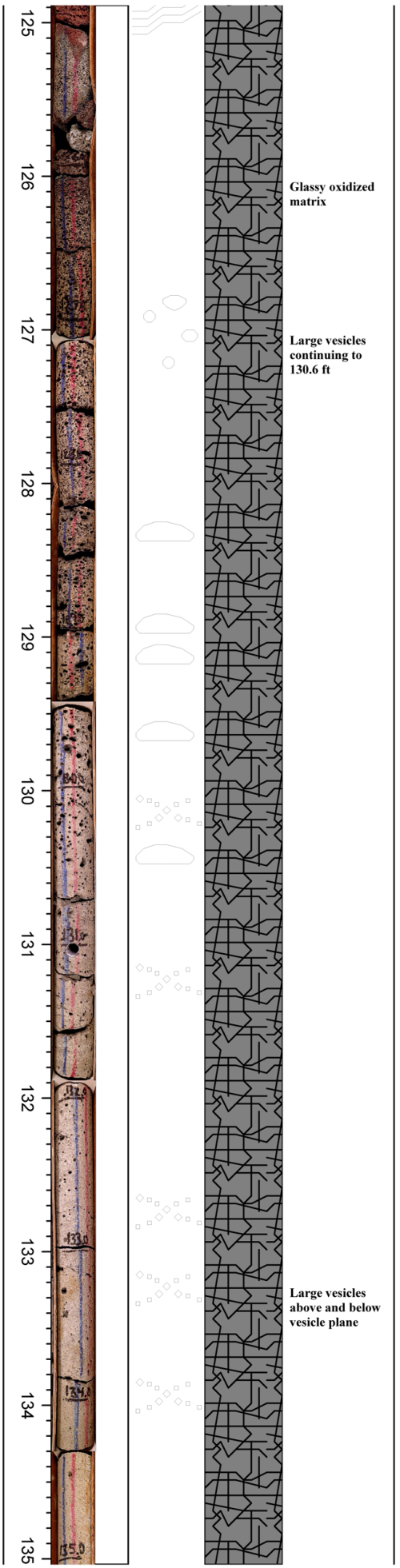
125
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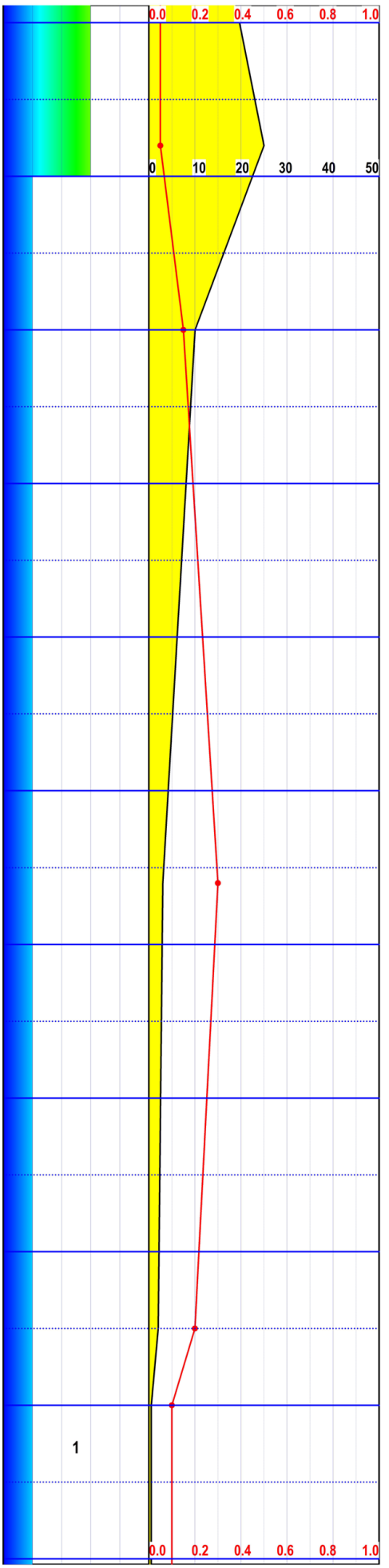
135
Glassy oxidized matrix
Large vesicles continuing to 130.6 ft
Large vesicles above and below vesicle plane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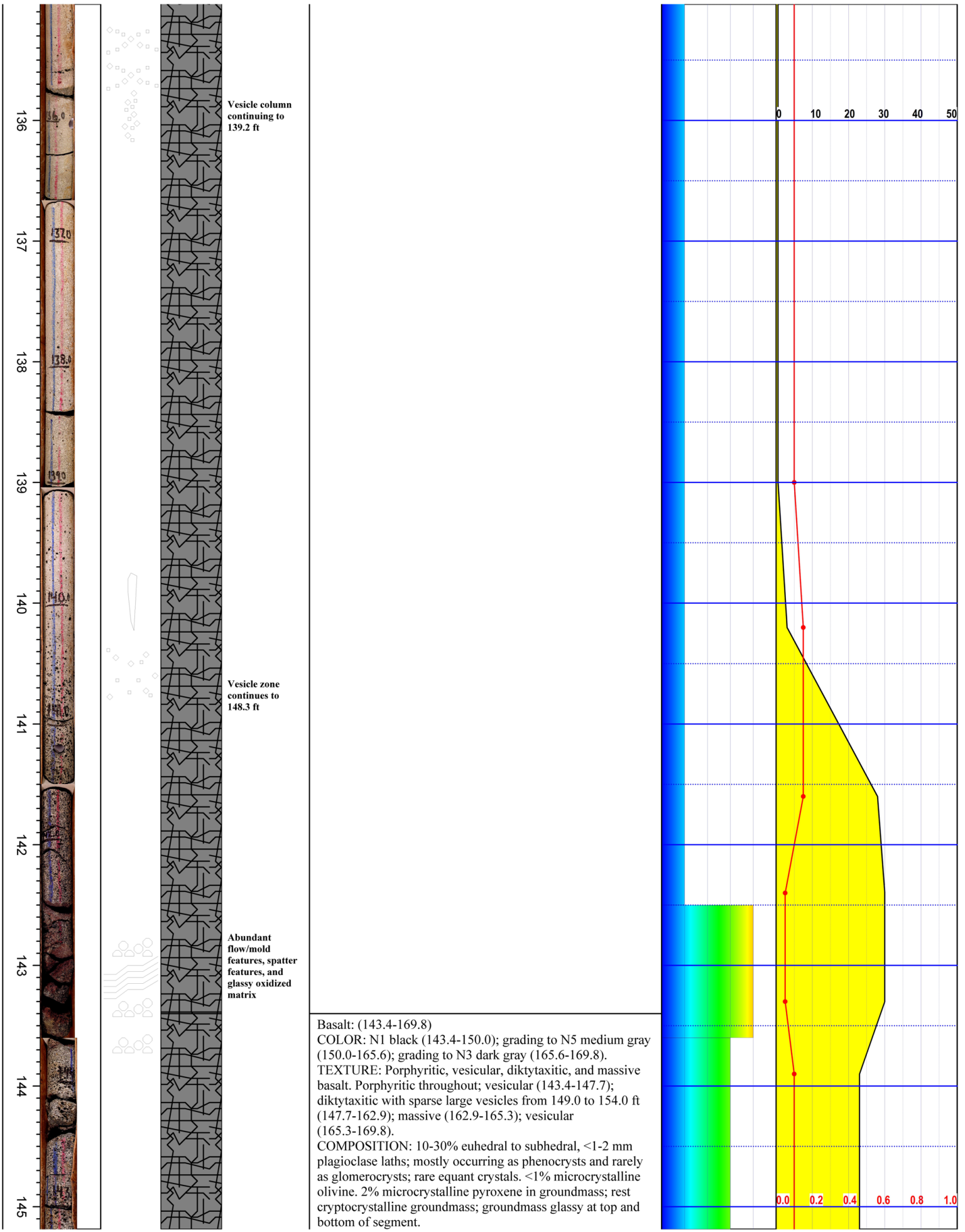
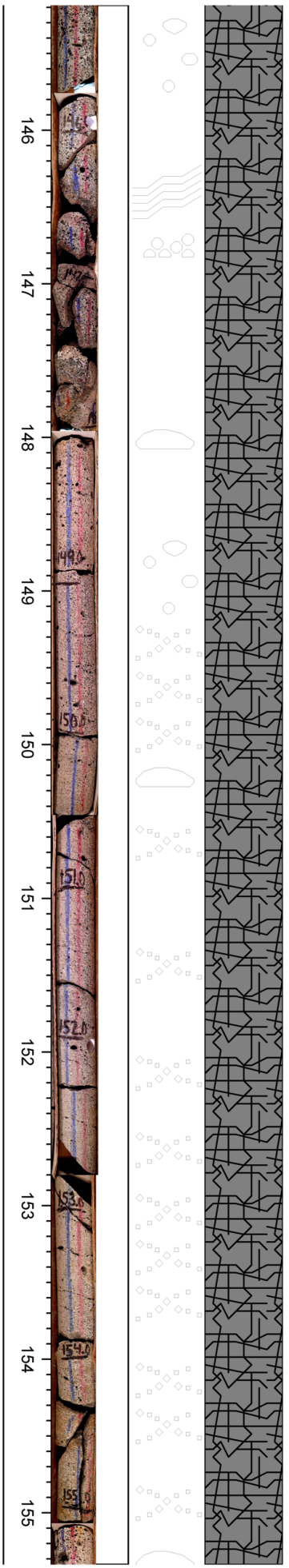
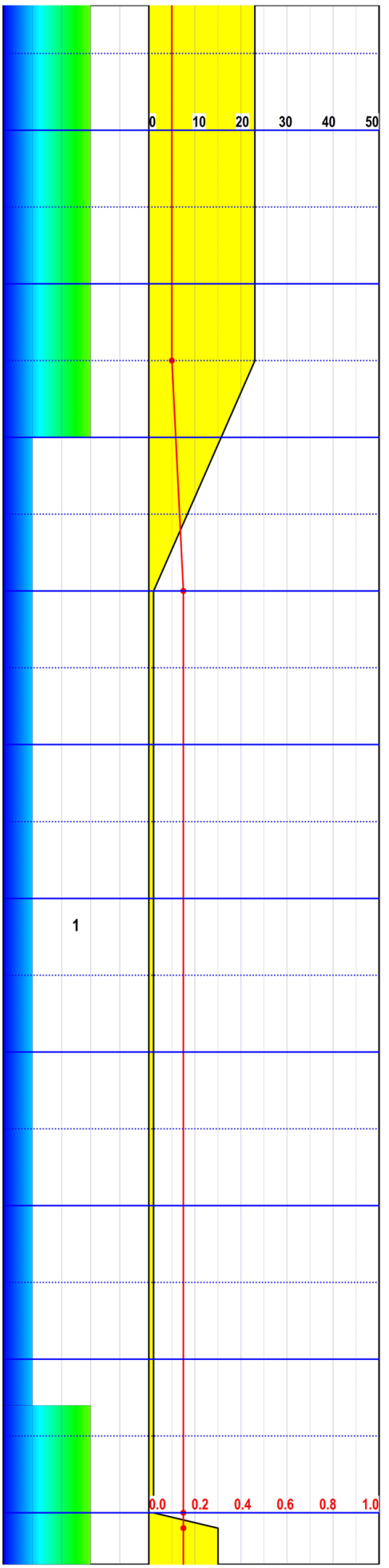
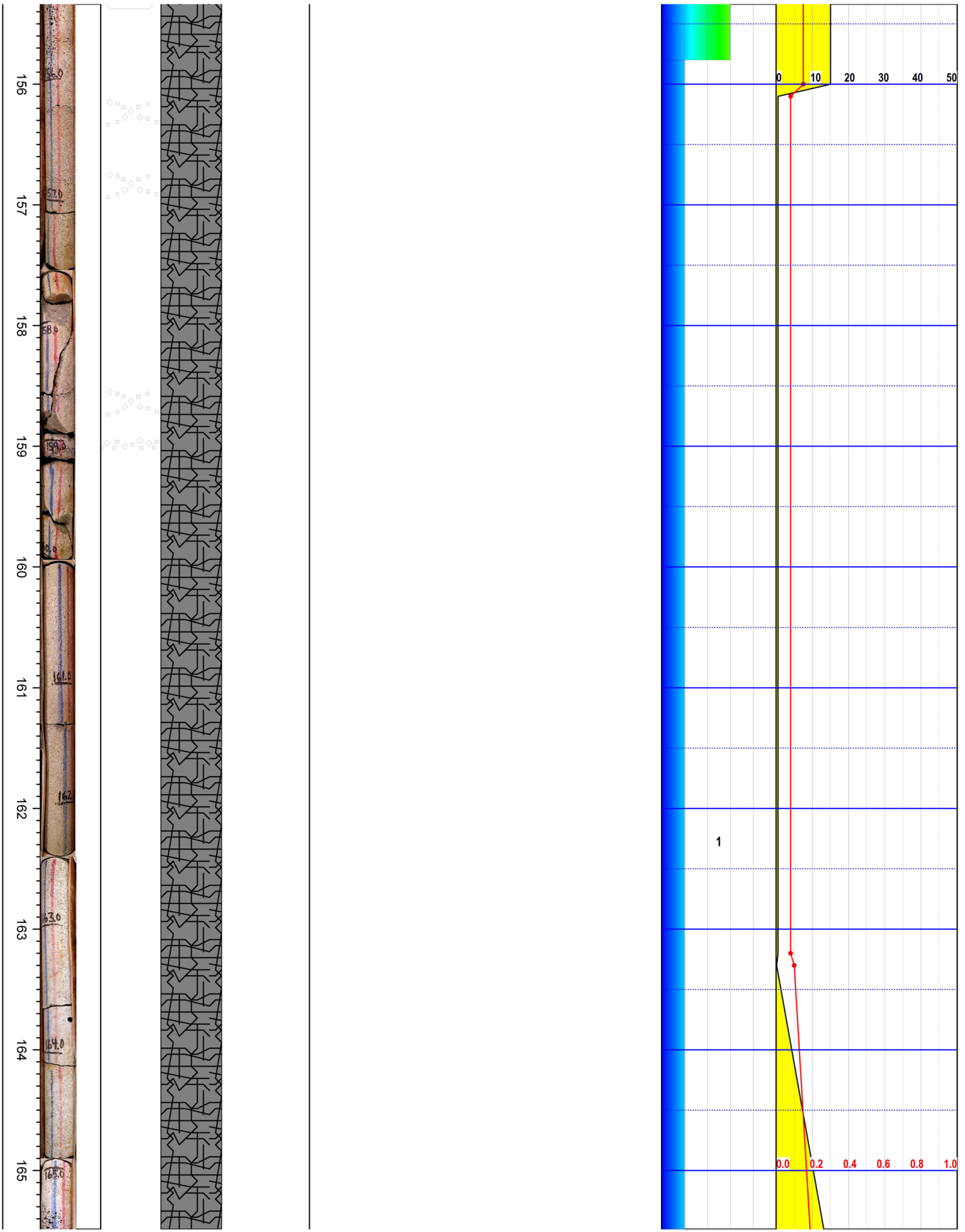


Basalt: (143.4-169.8)
COLOR: N1 black (143.4-150.0); grading to N5 medium gray (150.0-165.6); grading to N3 dark gray (165.6-169.8).
TEXTURE: Porphyritic, vesicular, diktytaxitic, and massive basalt. Porphyritic throughout; vesicular (143.4-147.7); diktytaxitic with sparse large vesicles from 149.0 to 154.0 ft (147.7-162.9); massive (162.9-165.3); vesicular (165.3-169.8).
COMPOSITION: 10-30% euhedral to subhedral, <1-2 mm plagioclase laths; mostly occurring as phenocrysts and rarely as glomerocrysts; rare equant crystals. <1% microcrystalline olivine. 2% microcrystalline pyroxene in groundmass; rest cryptocrystalline groundmass; groundmass glassy at top and bottom of segment.



XENOLITHS: None noted.
ALTERATION: 5RP 6/2 pale red purple oxidization on natural fracture surfaces. 10R 3/4 dark reddish brown and 5R 4/2 grayish red oxidization of flow features, spatter features, and glassy matrix. 10YR 8/2 very pale orange ribbon-like film on natural fracture surface (147.5). Olivine to iddingsite.

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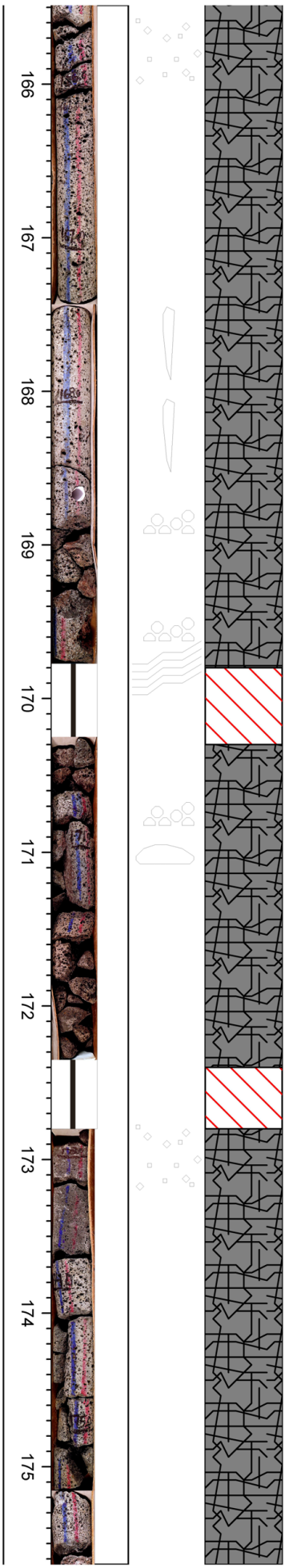


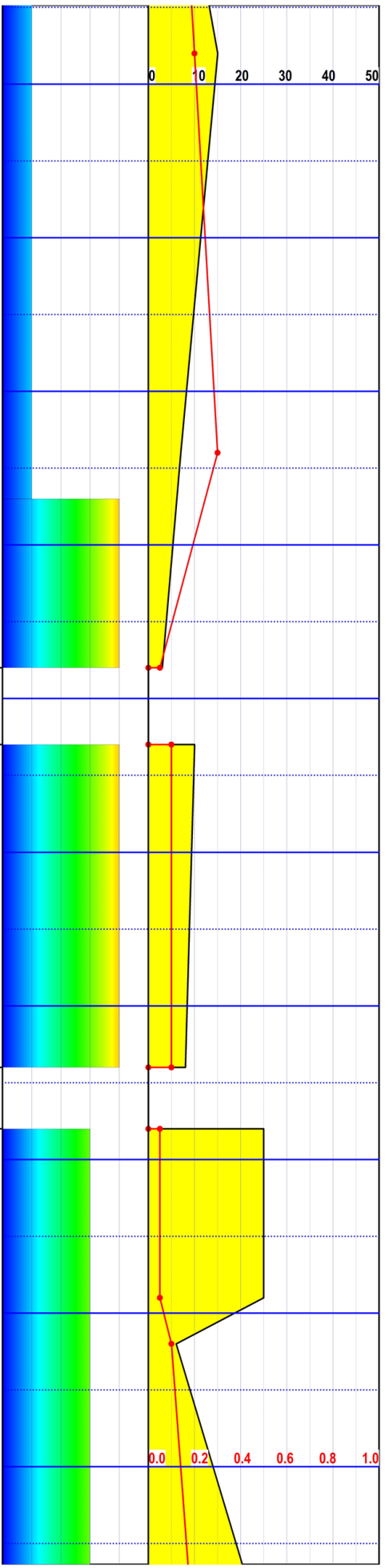
Missing Section: (169.8-170.3)
Rubble zone - loss of core

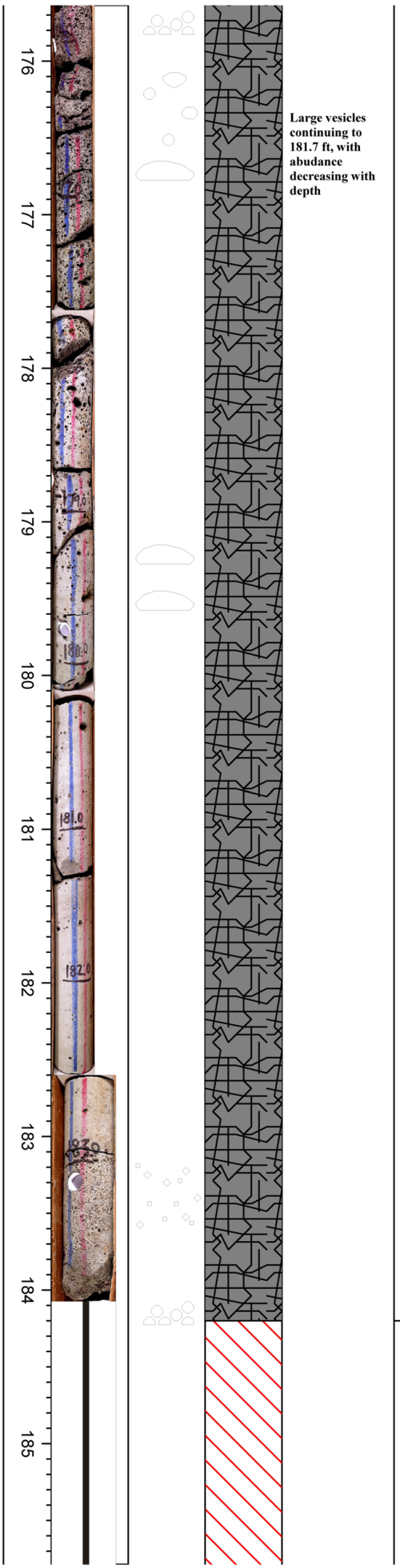
Basalt: (170.3-172.4)
COLOR: N2 grayish black top grading to N3 dark gray bottom.
TEXTURE: Vesicular, porphyritic, and aphanitic basalt. Vesicular throughout; porphyritic (170.3-171.6); aphanitic (171.6-172.4).
COMPOSITION: <1-30% euhedral to subhedral, <1-2 mm phenocrystic plagioclase. Microcrystalline to cryptocrystalline matrix with glassy matrix in places.
XENOLITHS: None noted.
ALTERATION: 10R 3/4 dark reddish brown oxidization on natural fracture surfaces with alteration intensity varying through segment. 5YR 4/4 moderate brown sporadic oxidization of spatter features.

Missing Section: (172.4-172.8)
Rubble zone - loss of core

Vesicle zone continues to 178.8 ft

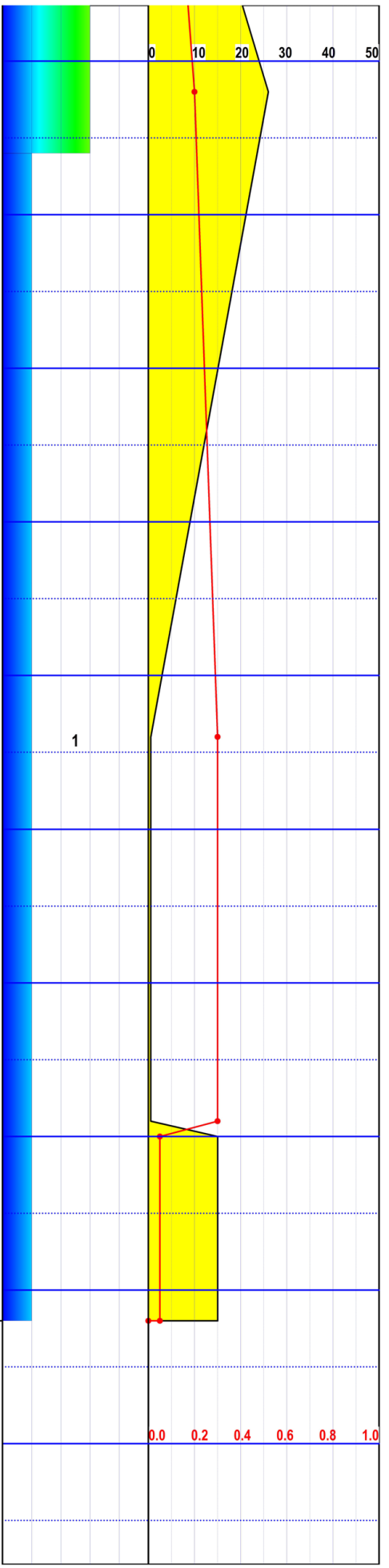
Basalt: (172.8-184.2)
COLOR: N3 dark gray top grading to N4 medium dark gray at bottom of segment.
TEXTURE: Vesicular, aphanitic, porphyritic, and massive basalt. Vesicular and weakly porphyritic with horizontal natural fractures top 2.7 ft (172.8-177.8); weakly vesicular and massive with large vesicles throughout segment (177.8-179.7); massive (179.7-183.0); vesicular (183.0-184.2).
COMPOSITION: 30% submillimeter euhedral to subhedral phenocrystic plagioclase. <1% glomerocrystic submillimeter olivine in massive segment.
XENOLITHS: None noted.
ALTERATION: 5RP 6/2 pale red purple oxidization of spatter features and sporadically on natural fracture surfaces.

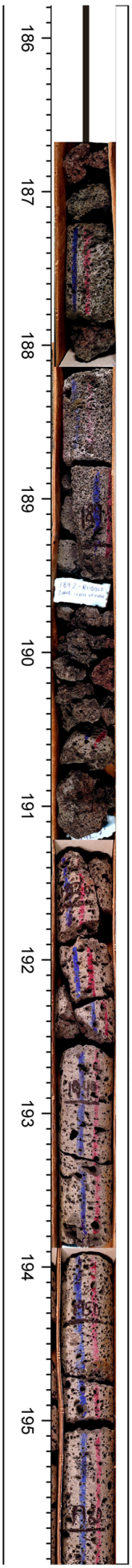


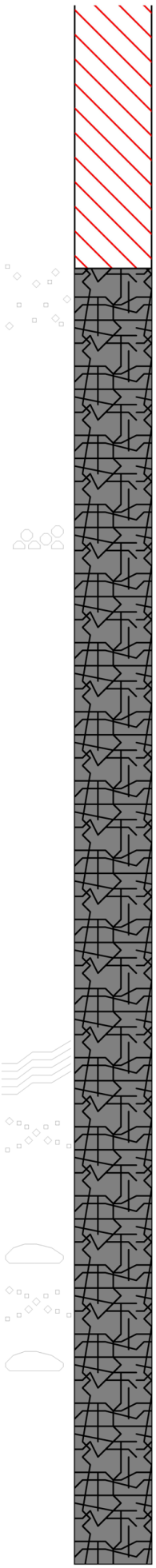


Large vesicles continuing to 181.7 ft, with abudance decreasing with depth

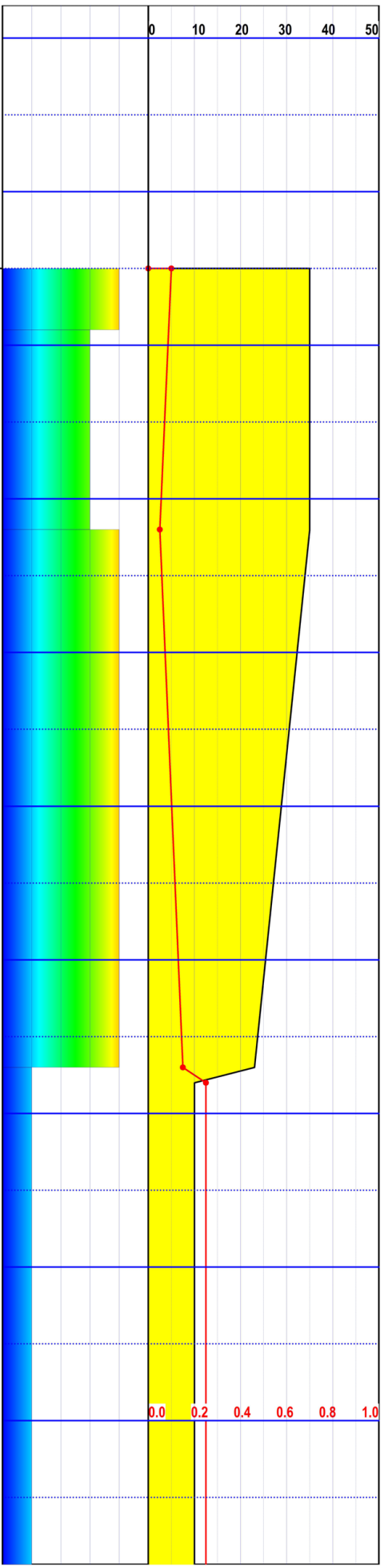
Missing Section: (184.2-187.5)
Rubble zone - loss of core

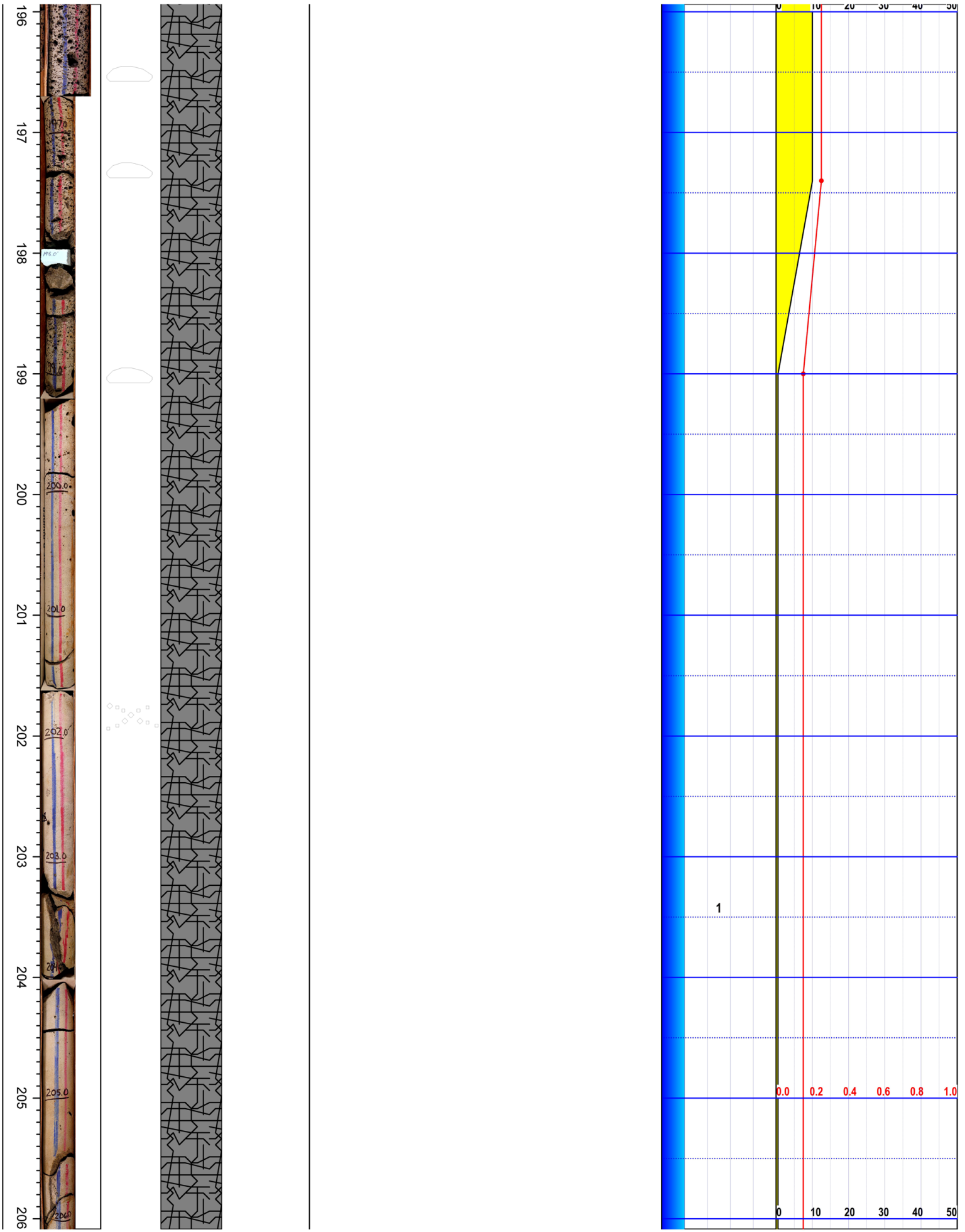


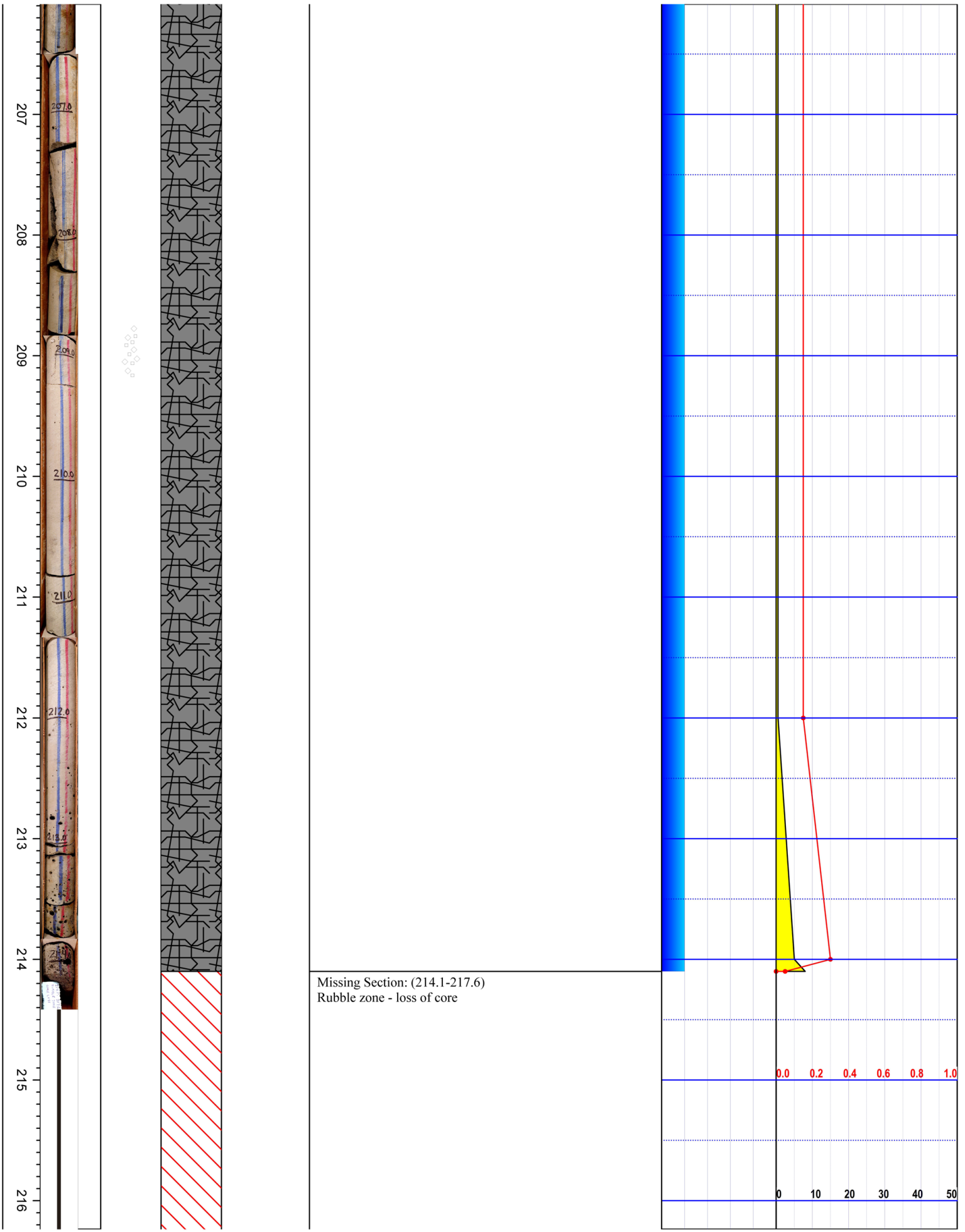


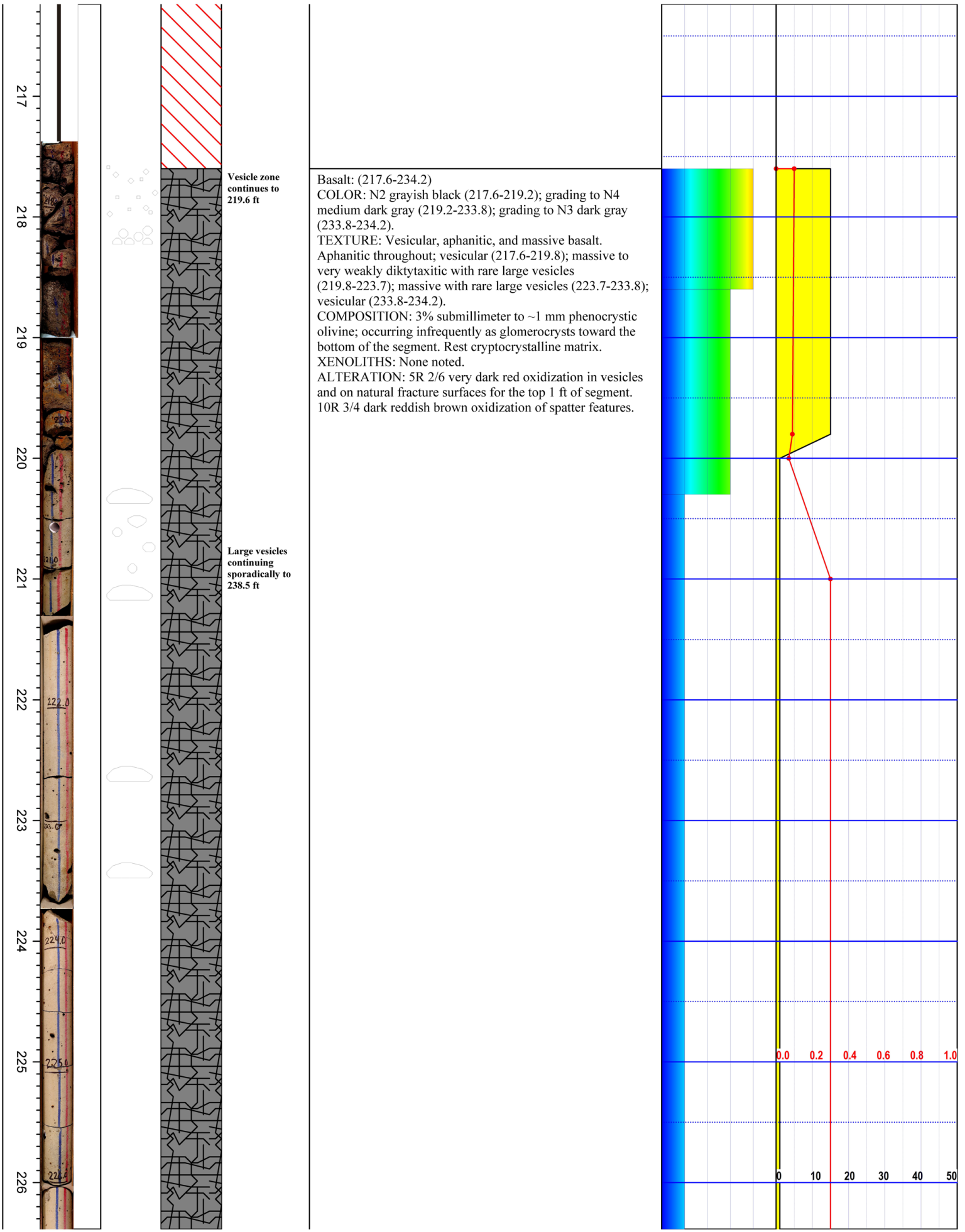


Basalt: (187.5-214.1)
COLOR: N2 grayish black (187.5-192.5) grading to (192.5-214.1).
TEXTURE: Aphanitic, vesicular, and massive basalt. Aphanitic throughout; vesicular with sparse large vesicles throughout (187.5-199.0); massive (199.0-212.8); massive and weakly vesicular increasing to vesicular toward bottom of segment and large vesicles abundance decreasing toward bottom of segment (212.8-214.1).
COMPOSITION: <1% submillimeter phenocrystic to glomerocrystic olivine; glomerocrysts in massive section and phenocrysts in top 4 above massive section. Microcrystalline to cryptocrystalline plagioclase in matrix.
XENOLITHS: None noted.
ALTERATION: 5YR 5/6 light brown to 5YR 6/4 light brown oxidization of spatter features throughout segment. 10YR 5/4 moderate yellowish brown sediment coating in natural fracture surfaces in massive section. 5RP 4/2 grayish red purple oxidization (201.4).
NOTES: Rubble zone with partial loss of core from 189.2 ft to 192.7 ft.

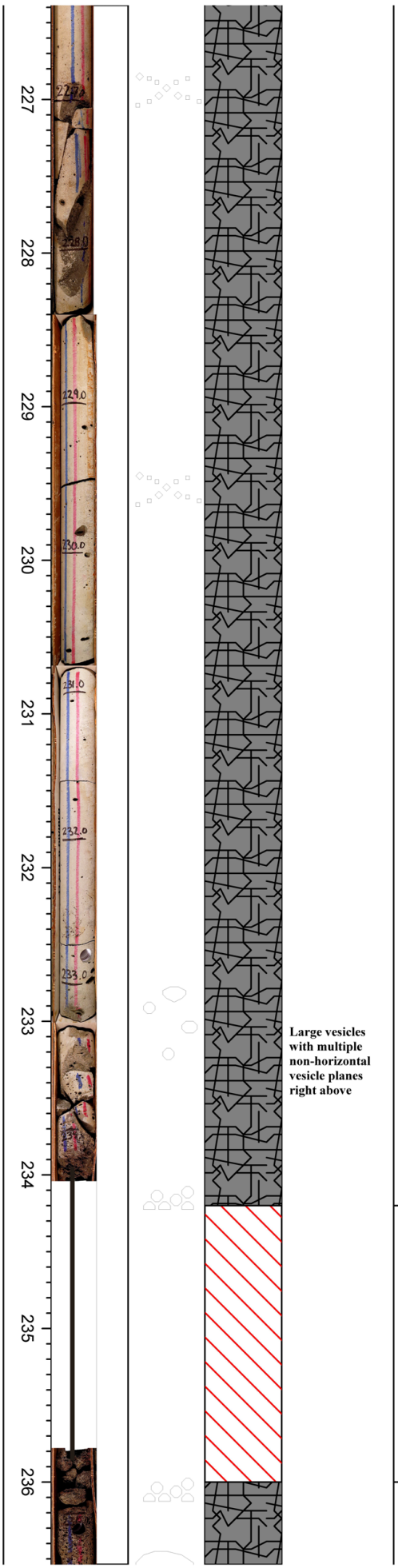



196
197
198
199
200
201
202
203
204
205
206
197.0
198.0
200.0
201.0
202.0
203.0
205.0
206.0
0
10
20
30
40
50
1
0.0
0.2
0.4
0.6
0.8
1.0


207
208
209
210
211
212
213
214
215
216
207.0
208.0
209.0
210.0
211.0
212.0
213.0
214.0
Missing Section: (214.1-217.6)
Rubble zone - loss of core
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
50



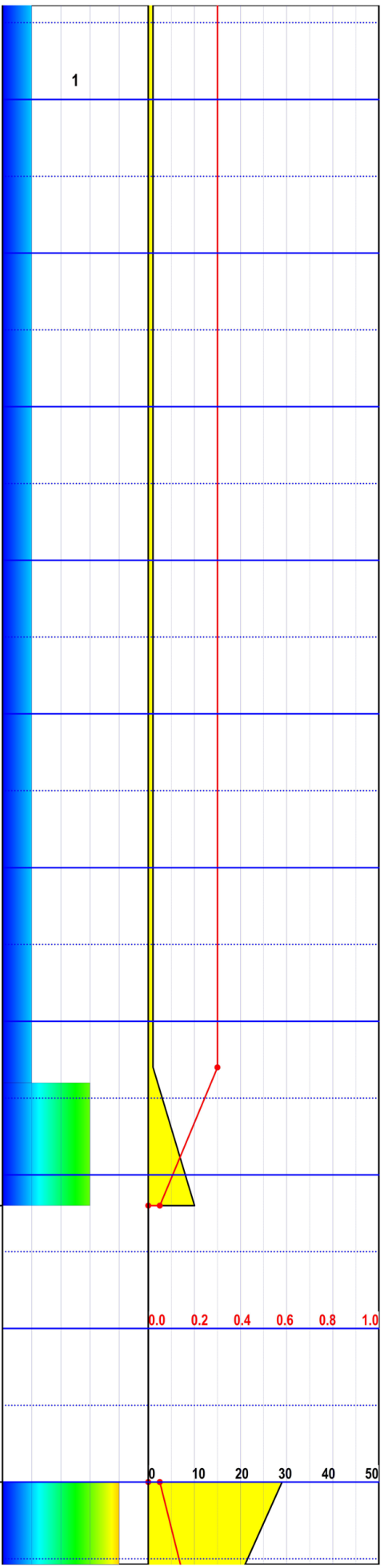
Basalt: (217.6-234.2)
COLOR: N2 grayish black (217.6-219.2); grading to N4 medium dark gray (219.2-233.8); grading to N3 dark gray (233.8-234.2).
TEXTURE: Vesicular, aphanitic, and massive basalt. Aphanitic throughout; vesicular (217.6-219.8); massive to very weakly diktytaxitic with rare large vesicles (219.8-223.7); massive with rare large vesicles (223.7-233.8); vesicular (233.8-234.2).
COMPOSITION: 3% submillimeter to ~1 mm phenocrystic olivine; occurring infrequently as glomerocrysts toward the bottom of the segment. Rest cryptocrystalline matrix.
XENOLITHS: None noted.
ALTERATION: 5R 2/6 very dark red oxidization in vesicles and on natural fracture surfaces for the top 1 ft of segment. 10R 3/4 dark reddish brown oxidization of spatter features.

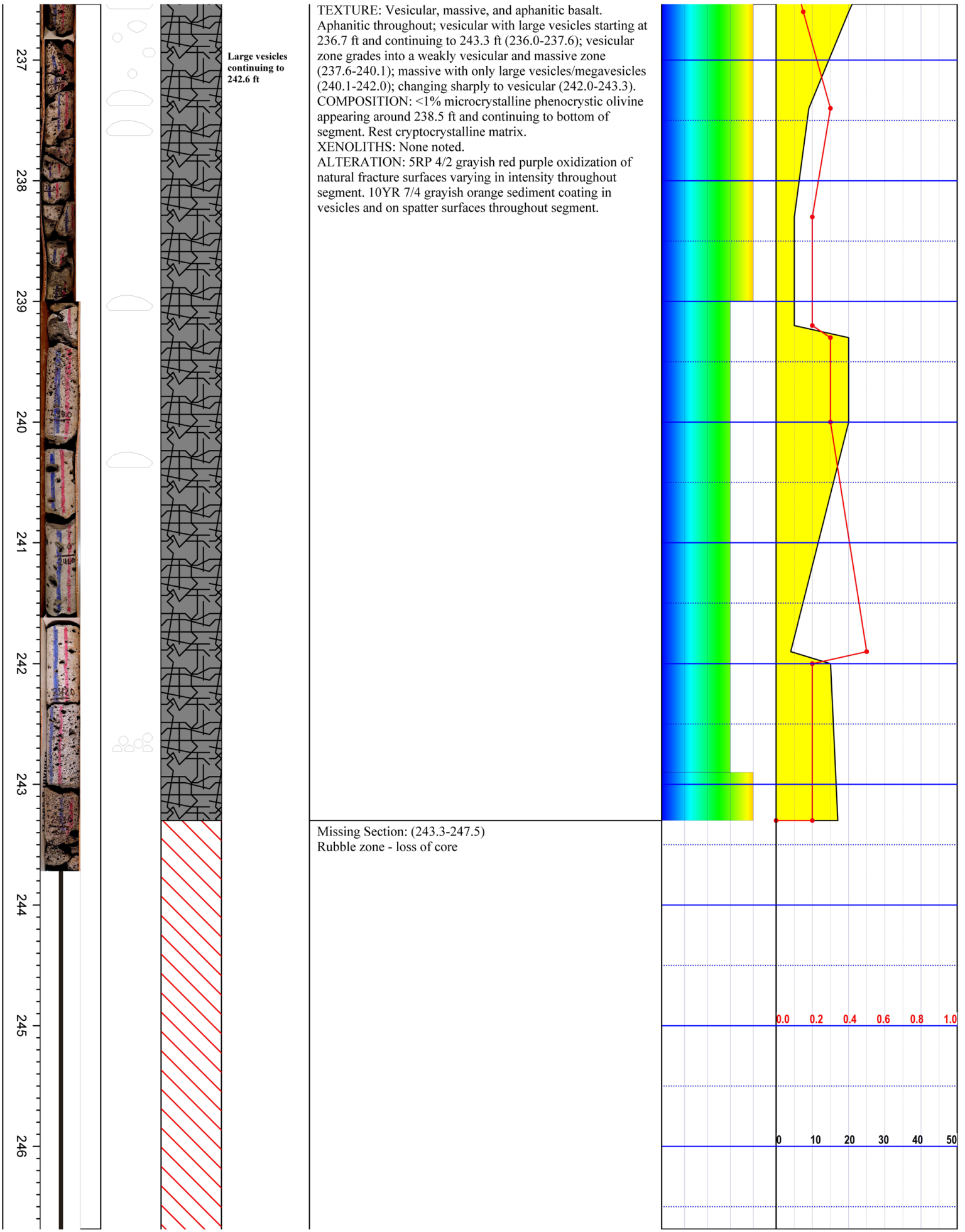


Large vesicles with multiple non-horizontal vesicle planes right above

Missing Section: (234.2-236.0)
Rubble zone - loss of core

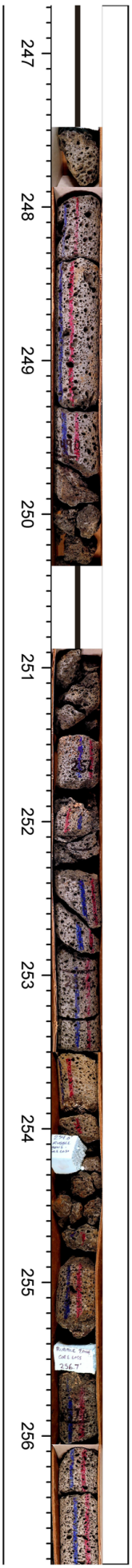
Basalt: (236.0-243.3)
COLOR: N2 grayish black (236.0-236.8); sharply changing to N3 dark gray and grading to N4 medium dark gray at bottom of segment (236.8-243.3).

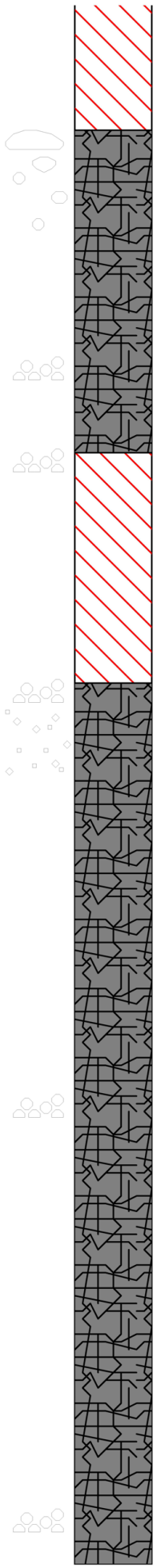




TEXTURE: Vesicular, massive, and aphanitic basalt. Aphanitic throughout; vesicular with large vesicles starting at 236.7 ft and continuing to 243.3 ft (236.0-237.6); vesicular zone grades into a weakly vesicular and massive zone (237.6-240.1); massive with only large vesicles/megavesicles (240.1-242.0); changing sharply to vesicular (242.0-243.3).
COMPOSITION: <1% microcrystalline phenocrystic olivine appearing around 238.5 ft and continuing to bottom of segment. Rest cryptocrystalline matrix.
XENOLITHS: None noted.
ALTERATION: 5RP 4/2 grayish red purple oxidization of natural fracture surfaces varying in intensity throughout segment. 10YR 7/4 grayish orange sediment coating in vesicles and on spatter surfaces throughout segment.

Missing Section: (243.3-247.5)
Rubble zone - loss of core

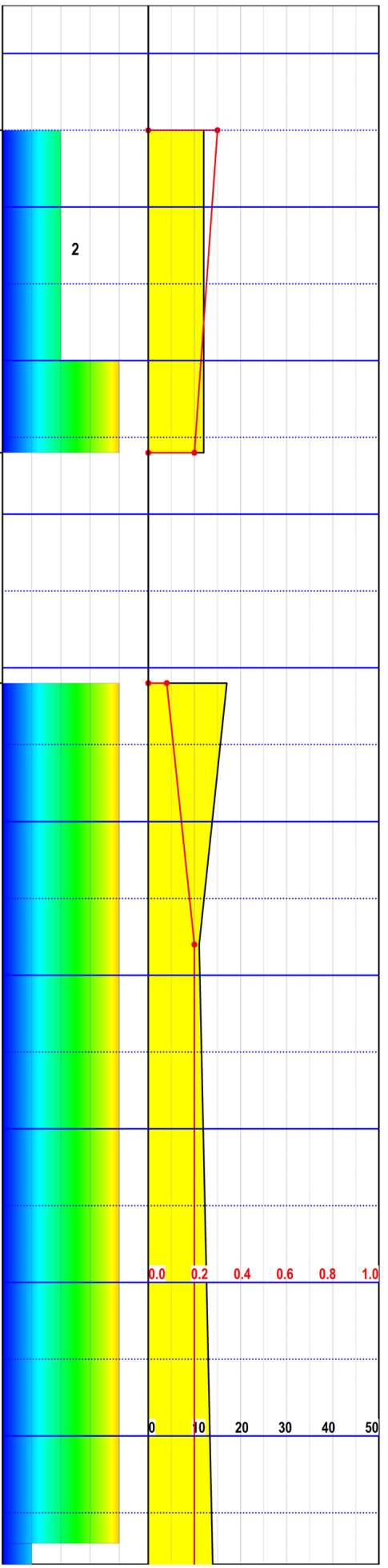


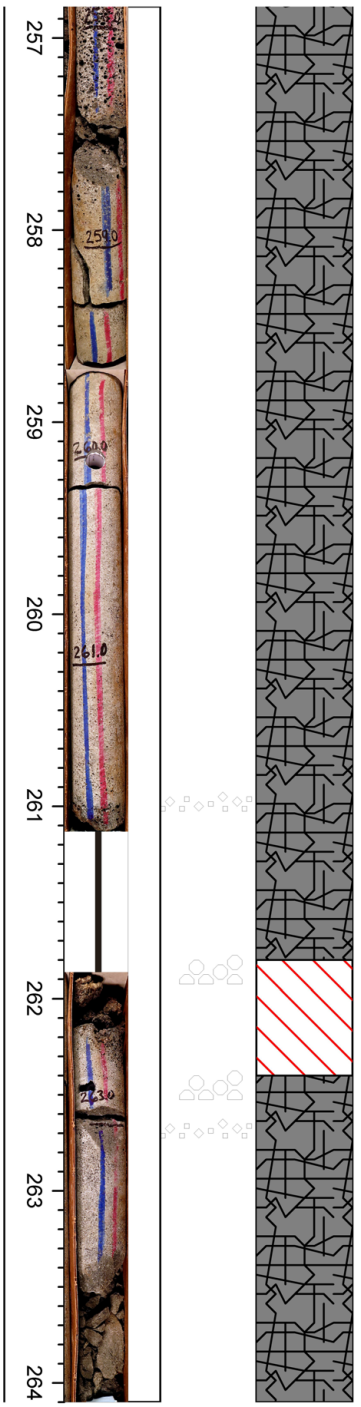


Basalt: (247.5-249.6)
COLOR: N3 dark gray throughout.
TEXTURE: Vesicular and aphanitic basalt; large vesicles throughout.
COMPOSITION: >99% cryptocrystalline matrix. <1% phenocrystic and glomerocrystic olivine.
XENOLITHS: None noted.
ALTERATION: 10YR 7/4 grayish orange sediment lightly and minimally coating natural fractures surfaces and vesicles. 10R grayish red oxidization of spatter features.

Missing Section: (249.6-251.1)
Rubble zone - loss of core

Basalt: (251.1-261.8)
COLOR: N3 dark gray (251.1-252.0); grading to N4 medium dark gray (252.0-261.6); grading to N2 grayish black (261.6-261.8).
TEXTURE: Porphyritic, vesicular, and massive basalt. Porphyritic throughout; vesicular (251.1-258.6); sharply transitioning to massive (258.6-261.7); vesicular (261.7-261.8).
COMPOSITION: 30-40% euhedral to subhedral, <1-3 mm equant and tabular phenocrystic plagioclase. 3% submillimeter subhedral phenocrystic olivine. Rest is microcrystalline matrix.
XENOLITHS: None noted.
ALTERATION: 5YR 8/4 moderate orange pink sediment coating containing super fine quartz sand cemented with silica that coats natural fracture surfaces and vesicles from 251.1 ft to 252.0 ft. N9 white amorphous calcite coating natural fracture at 252.1 ft and 253.9 ft. 10YR 6/2 pale yellowish brown reactive coating at 256.7 ft coating natural fracture surface. Subtle 5RP 4/2 grayish red purple oxidization of spatter features.
NOTES: Rubble zone with partial core loss from 254.0 ft to 256.2 ft.





Missing Section: (261.8-262.4)
Rubble zone - loss of core

Basalt: (262.4-264.1)
COLOR: N3 dark gray grading to N5 medium gray.
TEXTURE: Vesicular, diktytaxitic, and porphyritic basalt. Porphyritic throughout; Vesicular (262.4-262.7); and weakly diktytaxitic to massive (262.7-264.1).
COMPOSITION: 25% euhedral to subhedral <1-3 mm tabular plagioclase seldom forming glomerocrysts. 4% submillimeter phenocrystic olivine in diktytaxitic section.
XENOLITHS: None noted.
ALTERATION: 5Y 8/1 yellowish gray sediment coating in top 0.2 ft of segment. 5YR 3/4 moderate brown oxidization of spatter features.
NOTE: TVD of 148 at 264.1 ft. Deviated hole was drilled to a depth of 759.2 ft as 148A and is logged separately.